MOUNTAIN AREA EARLY ACTION COMPACT

For the City of Asheville, North Carolina

And

The Counties of

Buncombe, Haywood and Madison, North Carolina

March 31st Submittal

Letter of Transmittal

Since learning that the Mountain Area will achieve the current Federal Air Quality Standard for ozone, the member governments of the Mountain Area Early Action Compact have understood that we may continue participation in the EAC process as a voluntary effort. This will add local initiative to the state and federal work promoting public health and environmental stewardship. We are happy to continue our efforts both to serve local constituents and to extend this unique partnership among governments at all levels.

Unfortunately two of the original Mountain Area Early Action Compact member counties, Henderson and Transylvania, have chosen to leave the Compact, but still intend to work voluntarily with the group in some capacity.

Our previous submittals have dealt with documentation of stakeholder involvement in EAC plans and have discussed the initiatives planned by each member government. This document will complete the planning phase of the Early Action Compact. We look forward to a continued partnership to improve air quality.

On behalf of the Compact membership I wish to thank Kay Prince and other US Environmental Protection Agency staff for assistance with the EAC. Shelia Holman and the NCDAQ staff have been diligent and responsive to calls for assistance and we are grateful for their work. Finally, we extend a special thank you to Paul Muller of the Asheville office of DAQ for being a counselor, advocate and trusted advisor to the Mountain Area Early Action Compact.

Sincerely,

Jon Creighton
Buncombe County Planning Department

For member governments of the

Mountain Area Early Action Compact

Air Quality Improvement Initiative 2004

CITY OF ASHEVILLE

March 2004

Ozone is a molecule found in the atmosphere containing three oxygen atoms (O_3), while the oxygen we breathe has two oxygen atoms (O_2). Ozone occurs naturally in both the lower and upper atmosphere. Stratospheric ozone is a substance that absorbs the sun's harmful ultraviolet rays and protects the environment. Ground level ozone is the main ingredient in smog.

Ground level ozone occurs when nitrogen oxides (NO_x) and volatile organic compounds (VOCs) react together on warm sunny days. Ozone concentrations can increase to unhealthy levels during the warmer months. From April through October, hot weather and high total nitrogen oxide emissions from cars, coal-fired power plants, lawnmowers and other diesel- or gasoline-powered devices can create elevated concentrations of ground level ozone. Morning rush hour traffic is a major source of precursor chemicals to ground-level ozone formation. Ozone levels are normally highest during the hottest part of the afternoon and lowest in the early morning and night. Actions taken in the early hours of the day have a great effect on ozone levels the rest of the day.

The federal 120 parts per billion (ppb) one-hour standard was recently replaced with an 80-ppb eight-hour standard to protect human health. The Bent Creek air quality monitor violated the eight-hour ozone standard for 2000-2002. Thus part or all of Buncombe, Haywood, Henderson, Madison, and Transylvania counties may be designated "nonattainment" or not attaining the Federal Clean Air ozone standard. The Early Action Compact allows local government to delay or avoid "nonattainment" designation by proposing a plan to meet and maintain air quality standards. The following recommendations outline actions the public, businesses, and government agencies can take to reduce unhealthy levels of ozone. The actions will cut the amount of nitrogen oxides in the atmosphere by reducing the amount of fossil fuels burned on warm sunny days.

These are recommended actions for the City of Asheville and are based on work of the Asheville-Buncombe Stakeholders Group along with input from the public.

Actions the public can take on an ongoing basis to reduce ozone

PA 1
Keep your car tuned up. A car does not always have visible smoke from its tailpipe when it is producing excessive NO_x. An auto shop can often make minor repairs resulting in better gas mileage and less pollution from your tailpipe.

PA 2
Keep tires properly inflated. Proper tire inflation increases gas mileage and lowers the contribution to pollution.

PA 3
Carpool or vanpool. Join a carpool or vanpool for the trip to and from work. Local businesses, non-profit agencies and government agencies should seek sources of transportation for carpoolers in case of an emergency.

PA 4
Ride your bike. Bike on at least one errand a week. It's great exercise and a stress reliever.

PA 5
Take a walk. Walk to lunch with a friend instead of starting up the car. Walk to the next meeting or on an errand near home.

PA 6
Take the bus. Ride the bus to work or on an errand.

PA 7
Use an electric powered mower or a push mower. A two-stroke gas-powered lawnmower pollutes the equivalent of 40 late-model cars in just an hour. Use a rake on your leaves instead of a leaf blower. Reduce the need to mow by installing water-wise landscaping.

PA 8
Conserve energy and reduce pollution at home. Much of the region's electricity still comes from coal-fired generators. Turn off lights when not in use and reduce the use of the air conditioning with ceiling fans, good insulation, and a programmable thermostat. Replace paints and cleaning products with more environmentally friendly alternatives. Choose a gas fireplace and barbeque grill over wood or charcoal.

PA 9
Practice appropriate vehicle operating tips, such as shutting off the engine when parked. Avoid excessive idling at drive-throughs by parking and walking in. Operate the vehicle only on an as-needed basis to reduce emissions. Avoid travel through known congested areas whenever possible.

PA 10
Purchase products that meet the EPA Energy Star Program. Learn how much energy is used by the products you purchase.

Ozone Action Days
(Air Quality Index is predicted to be orange, red, or purple)
for the public and businesses

OAD 1

Tell your friends! Spread the word about Ozone Action Days and air quality issues. There are about eight to ten Ozone Action Days each year in our area. They can occur from late spring to early fall. These are days when our individual actions can make the most difference in comfort and health for everyone, especially those with asthma and chronic respiratory disorders.

The NC Division of Air Quality issues ozone forecasts during ozone season at 3pm each day for the following day. Forecasts for Buncombe and surrounding counties are available from WLOS TV and The Asheville Citizen-Times. Ozone forecasts are also available at 1-888-RU4NCAIR. The Division of Air Quality will e-mail or fax the forecast to you. Those features can be accessed at http://daq.state.nc.us/airaware/ozone.

OAD 2

Delay errands until late in the day. Cars driven in the morning hours produce NO_x and VOCs that become ground-level ozone in the heat of the afternoon. The more one can avoid driving, the better for air quality.

OAD 3

Don't mow your lawn until late in the day. Small engines like lawnmowers, weed whackers and leaf blowers lack pollution controls. The average lawnmower produces as much pollution in one hour as 40 late-model cars!

OAD 4

Bring your lunch or walk to lunch. Reduce your contribution to air pollution by not starting up your car at lunchtime.

OAD 5

Bus, Bike or Walk. If you find you're not affected by ozone on Ozone Action Days, take the bus, walk, or bike to work, to lunch, or on an errand.

OAD 6

Practice appropriate vehicle operating tips. Shut off the engine when parked. Operate the vehicle only on an as-needed basis to reduce emissions. Idling for 30 seconds to 1 minute emits more pollution than restarting your vehicle.

OAD 7

Do not use drive-through services. Avoid excessive idling at bank or fast food drive-throughs. Instead, park your vehicle and walk into the business. Businesses could voluntarily close their drive-through services until 11:00 a.m.

OAD 8

Telecommute. Businesses could allow employees with appropriate jobs to work at home when it is possible. Telecommunication from the home will reduce the number of vehicles emitting nitrogen oxides.

OAD 9

Participate in OAD program. Large and medium sized businesses are encouraged to participate in the NC Division of Air Quality Ozone Action Day (OAD) program.

Ozone Action Days (Air Quality Index is predicted to be orange, red, or purple) for local, state and federal government

G 1

Local government will seek participation of state and federal agencies in the following measures:

G 2

Limit morning meetings. Minimize scheduling of morning meetings involving auto travel between the hours of 8:00AM and 9:00AM when possible. Because OADs are declared with only one-day notice, the practice of delaying all meetings requiring auto travel should be encouraged during ozone season.

G 3

Practice appropriate vehicle operating tips. Shut off the engine when parked. Avoid excessive idling such as sitting at drive-throughs instead of walking in. Operate the vehicle only on an as-needed basis to reduce emissions. Avoid travel through known congested areas whenever possible.

G 4

Work schedules. Limit vehicle/equipment use. Encourage multiple crew transports using higher occupancy vehicles.

G 5

Nonessential operations. Reschedule operations under direct control of the city such as driving, lawn maintenance, tree trimming, and use of power saws, generators and similar gasoline or diesel-powered equipment. Bid similar contracted work with an alternate to halt operations on ozone action days.

G 6

Paving. Reschedule nonessential paving activities, including pothole repairs. Bid similar contracted work with an alternate to halt operations on ozone action days.

G 7

Alternative Transportation/ Alternative Fuels. Explore the use of alternative fuels, including diesel and off-road diesel fuels, to reduce NO_x emissions, subject to availability of reliable sources of supply. Consider purchase of commercially available hybrid vehicles for use in non-emergency fleet.

G 8

Cleaner Burning Gasoline, Diesel Fuel and off-road Diesel Fuel. Track statewide initiatives to bring cleaner burning fuels to area retailers during ozone season or year round.

G 10
Smoking Vehicles. Smoking vehicles are heavy polluters. Local law enforcement agencies will be educated on the state statute concerning smoking vehicles and encouraged to increase enforcement. Local government will publicize programs for citizen reporting of smoking vehicles.

G 11
Tree Planting Program. Ozone formation is exacerbated by high temperatures. Because of the urban heat-island effect, temperatures in cities can average up to 15 degrees higher than nearby rural areas. Trees clean and cool the air. They shield from the sun hard surfaces that would otherwise store and radiate heat, and they release cooling moisture. Mature trees increase property values. The City of Asheville, through its proposed 2025 plan, will continue to require tree planting.

G 12
Hybrid-Electric Technology. The City of Asheville will explore the possibility of using hybrid-electric technology whenever possible.

G 13
Retrofit Technology. Purchase of applicable fuel line and electric spark controller retrofit technologies are being explored. Successful devices have proven to reduce Hydrocarbon, Carbon Monoxide, and Nitrogen Oxides, while improving engine performance and fuel consumption. Some retrofits have already occurred to Asheville Transit Services vehicles.

G 14
Service Contracts. Departmental requirements specific to OADs will be incorporated into service contracts. Purchase and service contracts will specify energy-efficient equipment and maintenance practices.

G 15
Annual In-House Training. An annual training program to increase awareness of OAD responsibilities of Departments and employees will be developed. OAD orientation packets for new employees will be developed.

G 16
OAD Coordinators. The City will appoint one or more Ozone Action Day Coordinators to manage OAD initiatives. The Coordinator will participate in the state OAD program.

G 17
Telecommute. Local government could allow employees with appropriate jobs to work at home when it is possible. Telecommuting from the home will reduce the number of vehicles emitting nitrogen oxides.

Ongoing Actions to Reduce Ozone

OA 1
Clean burning fuels. Local government will collaborate with area fuel suppliers to accelerate availability of clean gasoline/diesel fuels.

OA 2
Western North Carolina Regional Air Quality Agency. The City has supported this agency and its programs for more than thirty years and will continue to do so.

OA 3
Public Education Campaigns. Develop educational brochures and related materials for children about air quality. Provide for a public relations component within the WNCRAQA to assist in media relations and public education efforts.

OA 4
Outreach. Work with area governmental entities and local media to develop educational outreach programs.

OA 5
Themes. Develop air quality themes for use in advertising on busses and other public venues. Tie themes to air quality summits to provide businesses, institutions and government with information on what each sector can do to improve air quality.

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Cultural Outreach. A bilingual and multicultural educational outreach program for air quality will be developed that expands current public outreach efforts to all citizens.

OA 7
Community Outreach. Provide air quality tips to neighborhood associations who can pass out the information to individual households.

OA 8

Business Involvement. Local governments will encourage involvement of area businesses in OAD programs.

OA 9

Conserve energy and reduce pollution at work. Much of the region's electricity still comes from coal. Turn off lights when not in use. Reduce the use of air conditioning with good insulation and window blinds. Use programmable thermostats to reduce energy use for heating and cooling. Replace paints and cleaning products with more environmentally friendly alternatives.

OA 10
Land Use. Mixed-use neighborhoods in which residents can access both commercial and residential destinations using a variety of transportation modes are conducive to less driving by residents. In accordance with the proposed 2025 Plan, the City is working to adopt measures to encourage construction on vacant or underused land in the City and to increase density along designated transit corridors. City officials will continue to support such planning.

OA 11
Conversion to Alternative Fuels. The City, through Land-of-Sky Regional Council, will seek DOE Clean Cities designation in order to promote greater availability of clean gasoline, diesel and alternative fuels. Clean Cities designation will also facilitate the creation of infrastructure necessary for the utilization of these fuels.

OA 12
Low sulfur fuels. Develop community support in order to encourage the petroleum industries to make low sulfur gas and diesel fuels available in the Compact area by April 2005.

OA 13
Ride the bus. In order to encourage bus ridership, the Asheville Transit System will explore options such as business sponsorships to provide free bus service and promote bus ridership on OADs.

OA 14
Energy Star. Purchase products that meet the EPA Energy Star Program. Government agencies should consider the energy efficiency of the products they buy.

OA 15
AQ Group. The City of Asheville should collaborate to form a permanent advisory group to address air quality and other environmental issues.

Asheville-Buncombe Council
Mountain Area Early Action Compact
Recommendations to
Buncombe County Board of Commissioners

Ozone is a molecule found in the atmosphere containing three oxygen atoms (O_3), while the oxygen we breathe has two oxygen atoms (O_2). Ozone occurs naturally in both the lower and upper atmosphere. Stratospheric ozone is a substance that absorbs the sun's harmful ultraviolet rays and protects the environment. Ground level ozone is the main ingredient in smog.

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These are recommended actions for Buncombe County and the City of Asheville and are based on work of the Asheville-Buncombe Council of the Mountain Area Early Action Compact. Our goal was to develop proposed strategies to be included in a required report to the Environmental Protection Agency and due on March 31, 2004.

Since beginning the planning, it has become apparent that our area will achieve the standards for the year 2003. This is due in large part to a cool and wet summer, which inhibits the formation of ozone. Since we are in compliance, our participation in the Compact is voluntary, however; we recommend continued participation in the program to improve air quality and to guard against future non-attainment of standards.

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Carpool or vanpool Join a carpool or vanpool for the trip to and from work. Local businesses, non-profit agencies and government agencies should seek sources of transportation for carpoolers in case of an emergency.

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Take a walk. Walk to lunch with a friend instead of starting up the car. Walk to the next meeting or on an errand near home.

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Tree Planting Program. High temperatures exacerbate ozone formation. Because of the urban heat-island effect, temperatures in cities can average up to 15 degrees higher than nearby rural areas. Trees clean and cool the air. They shield from the sun hard surfaces that would otherwise store and radiate heat and they release cooling moisture. Mature trees increase property values. The City of Asheville, through its proposed 2025 plan, will continue to require tree planting. **This initiative applies to the City of Asheville only.**

G 12

Hybrid-Electric Car Pilot Project. The County of Buncombe is evaluating the cost effectiveness and performance of hybrid-electric technology. The Western North Carolina Regional Air Quality Agency (WNCRAQA) has procured two Toyota Prius Hybrid-Electric vehicles. If this pilot project is successful, the County intends to specify that all new car purchases for non-emergency use be hybrid-electric.

G 13

Retrofit Technology. Purchase of applicable fuel line and electric spark controller retrofit technologies are being explored. Successful devices have proven to reduce Hydrocarbon, Carbon Monoxide, and Nitrogen Oxides, while improving engine performance and fuel consumption. Some retrofits have already occurred to County school busses and Asheville Transit Services vehicles.

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Outreach. Work with area governmental entities and local media to develop educational outreach programs.

OA 5
Themes. Develop air quality themes for use in advertising on busses and other public venues. Tie themes to air quality summits to provide businesses, institutions and government with information on what each sector can do to improve air quality.

OA 6
Cultural Outreach. A bilingual and multicultural educational outreach program for air quality will be developed that expands current public outreach efforts to all citizens.

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Community Outreach. Provide air quality tips to neighborhood associations who can pass out the information to individual households.

OA 8
Business Involvement. Local governments will encourage involvement of area businesses in OAD programs.

OA 9
Conserve energy and reduce pollution at work. Much of the region's electricity still comes from coal. Turn off lights when not in use. Reduce the use of air conditioning with good insulation and window blinds. Use programmable thermostats to reduce energy use for heating and cooling. Replace paints and cleaning products with more environmentally friendly alternatives.

OA 10
Land Use. Mixed-use neighborhoods in which residents can access both commercial and residential destinations using a variety of transportation modes are conducive to less driving by residents. In accordance with the proposed 2025 Plan, the City is working to adopt measures to encourage construction on vacant or underused land in the City and to increase density along designated transit corridors. City officials will continue to support such planning. **This initiative applies to the City of Asheville only.**

OA 11
Conversion to Alternative Fuels. The City and County, through Land-of-Sky Regional Council, will seek DOE Clean Cities designation in order to promote greater availability of clean gasoline, diesel and alternative fuels. Clean Cities designation will also facilitate the creation of infrastructure necessary for the utilization of these fuels.

OA 12
Low sulfur fuels. Develop community support in order to encourage the petroleum industries to make low sulfur gas and diesel fuels available in the Compact area by April 2005.

OA 13
Ride the bus. In order to encourage bus ridership, the Asheville Transit System will explore options such as business sponsorships to provide free bus service and promote bus ridership on OADs. **This initiative applies to the City of Asheville only.**

OA 14
Energy Star. Purchase products that meet the EPA Energy Star Program. Government agencies should consider the energy efficiency of the products they buy.

OA 15
AQ Group. Buncombe County and the City of Asheville should collaborate to form a permanent advisory group to address air quality and other environmental issues.

HAYWOOD COUNTY EARLY ACTION COMPACT STAKEHOLDERS

A. Primary organization responsible for EAC activities: Haywood County

B. Lead Contact: Richard Honeycutt

C. Organization Chart- Attached list of Stakeholders

D. Meetings Held

1. Haywood County Council of Governments met on December 11, 2002 to approve initiating Early Action Compact.

2. The Board of Commissioners approved for Haywood County to be a part of the Early Action Compact on December 16, 2002.

2. Meetings of the Stakeholders were held on March 19, 2003, April 2, 2003 and April 30, 2003 with good participation. Meetings were held in the Commissioners' Board Room and the Agricultural Services Center.

E. Proposed Local Control Measures

1. Local Government will encourage the following public actions for normal days:

- ☐ **Keep your car tuned up.** A car does not always have visible smoke from its tailpipe when it is producing excessive NOx. An auto shop can often make minor repairs resulting in better gas mileage and less pollution from your tailpipe. Keep tires properly inflated and maintain regular tune-ups to lower the contribution to pollution.
- ☐ **Carpool or vanpool.** Join a carpool or vanpool for the trip to and from work.
- ☐ **Ride your bike.** Bike on at least one errand a week. It's great exercise and a stress reliever.
- ☐ **Take a walk.** Walk to lunch with a friend instead of starting up the car. Walk to the next meeting or on an errand near home.
- ☐ **Take the shuttle when possible.**
- ☐ **Purchase energy efficient appliances.**

- ☐ **Build energy efficient houses or improve energy efficiency in existing houses.**

- ☐ **Use an electric powered mower or a push mower.** A two-stroke gas-powered lawnmower pollutes the equivalent of 40 late-model cars. Use a rake on your leaves instead of a leaf blower. Reduce your need for mowing by installing water-wise landscaping.

- ☐ **Conserve energy and reduce pollution at home.** Much of the region's electricity still comes from coal. Turn off lights when not in use and reduce the use of the air conditioner with ceiling fans, good insulation, and a programmable thermostat. Replace paints and cleaning products with more environmentally-friendly alternatives. Choose a gas fireplace and barbeque grill over wood or charcoal.

2. Ozone Action Days for Public. The County Government Access Channel may be used to deliver information on Ozone Action Days.

   - ☐ **Delay errands until late in the day.** Cars driven in the morning hours produce NOx and VOCs that become ground-level ozone in the heat of the afternoon. The more one can avoid driving, the better for air quality.

   - ☐ **Don't mow your lawn until late in the day.** Small engines like lawnmowers, weed whackers and leaf blowers lack pollution controls.

   - ☐ **Bring your lunch or walk to lunch.** Reduce your contribution to air pollution by not starting up your car at lunchtime.

   - ☐ **Take the shuttle.** Take the shuttle to work, to lunch, or on an errand.

   - ☐ **Take a walk.** If you have an errand to run that's a short distance away, try walking instead of driving.

   - ☐ **Ride your bike.** Ride your bike on morning errands. If you find that you're not affected by ozone on Ozone Action Days, try biking to work or school.

   - ☐ **Tell your friends!** Spread the word about Ozone Action Days and air quality issues.

3. Ozone Action Days for Local Government

   - ☐ **Minimize movement in vehicles.** Use of fleet vehicles will be used for essential use only. Meetings requiring traveling by fleet vehicles are to be canceled when possible, or implement the use of e-mail and conference calls.

   - ☐ **Minimize scheduling of morning meetings between the hours of 8:00AM and 9:00AM when possible or teleconference.** Because OADs are declared with only one-day notice, the practice of delaying meetings should be encouraged year-round.

- ☐ **Practice appropriate vehicle operating tips,** such as shutting off the engine when parked, avoiding excessive idling such as sitting at drive-thru's, and leaving the vehicle running while parked. Operate the vehicle only on an as-needed basis to reduce emissions. Avoid travel through known congested areas whenever possible.

- ☐ **Work schedules** should reflect limited vehicle/equipment use and should encourage multiple crew transports using higher occupancy rate vehicles.

- ☐ **Reschedule nonessential operations** such as lawn maintenance, tree trimming, and use of power saws, generators, etc., which include other gasoline-powered equipment.

4. Long-term Local Government actions to reduce ozone

- ☐ **Investigate the supply of alternative fuels to the County.**

- ☐ **Develop network of coordinators throughout the County for ozone notifications and other information.**

- ☐ **Commute Solutions:** Encourage ride sharing for regional trips.

- ☐ **Land Use:** Encourage the continued development of greenways, and mixed-use neighborhoods in which residents can access both commercial and residential destinations using a variety of transportation modes. Encourage smart growth by utilizing vacant or underused land. Town officials are actively supporting increased housing in the downtown area.

- ☐ **Downtown Guide:** The towns are encouraging walkable communities. Some have developed a walking guide to the Town.

- ☐ **Smoking Vehicles:** It is estimated that 10% of vehicles produce 90% of vehicular pollution. Encourage citizens to report smoking vehicles on form to the State of North Carolina. (Form available on web site daq.state.nc.us/smoking.shtml.

- ☐ **Tree Planting Program:** Ozone formation is exacerbated by high temperatures. Because of the urban heat-island effect, temperatures in cities can average up to 15 degrees higher than nearby rural areas. Trees clean and cool the air. They shield from the sun hard surfaces that would otherwise store and radiate heat, and they release cooling moisture. Mature trees increase property values. Encourage tree-planting programs with agencies.

- ☐ **Hybrid-Electric Car Pilot Program:** Local Governments will evaluate the cost effectiveness and performance of hybrid-electric technology.

- ☐ **Retrofit Technology:** Purchasing of applicable fuel line and electric spark controllers retrofit technologies are being explored. Successful devices have proven to reduce Hydrocarbon, Carbon Monoxide, and Nitrogen Oxides, while improving engine performance and fuel consumption. Seek grants for retrofitting diesel engines.

- ☐ **Service Contracts:** Department specific OAD requirements will be incorporated into purchase and service contracts.

- ☐ **In-House Training:** Development of an annual training program to increase awareness of OAD responsibilities of Departments and employees. Placement of the OAD into orientation packets for new employees.

5. Department Specific Plans for Ozone Action Days. On OADs, the following practices will be implemented:

- ☐ **Reschedule nonessential operations** using gasoline-powered equipment, such as lawnmowers, edgers, blowers, power saws, tree trimmers, and generators.

- ☐ **Reschedule nonessential construction, when possible.**

- ☐ **Operation of construction and heavy equipment will be restricted to essential use, when possible.**

- ☐ **Personnel shall be encouraged to limit travel on ozone action days.**

- ☐ **Reschedule controlled burning permits.**

- ☐ **Reschedule nonessential inspections on commercial establishments.**

6. Public Education

- ☐ **Obtain and distribute flyers and information on air quality.**

- ☐ **Use the County Government Access Channel** to show video and other information on air quality.

- ☐ **Provide a speakers bureau on air quality** for civic club meetings and other resources.
- ☐ **Use the County Information line and County Web site to disseminate information.**
- ☐ **Participate in training programs and invite business and industry to participate.**

Madison County Air Quality Council

Recommendations to the

Madison County Board of Commissioners

Regarding the

Mountain Area Early Action Compact

March 8, 2004

Madison County is part of a five county area that has been at risk to be designated by state and federal officials as not attaining the Federal Clean Air Standards for Ozone. In December of 2002, County Boards of Commissioners in all five of those counties voted to form the Mountain Area Early Action Compact (EAC) as a vehicle to work jointly to improve air quality in the region.

The Compact is a contract among local governments, the NC Division of Air Quality and the US Environmental Protection Agency. Local governments have agreed to seek methods to accelerate compliance with air quality standards. In return, regulatory agencies agree to defer non-attainment status so long as certain dated milestones are met.

Non-attainment of standards poses several risks to Madison County and to the region. Acute respiratory disorders are exacerbated by ozone. Cumulative exposure can negatively affect general public health. Transportation improvements throughout the region may be delayed by non-attainment status. Restrictions on some types of industrial recruitment and expansion will be imposed. Businesses dependent on travel and tourism may experience a downturn. The commercial and residential real estate market may be depressed.

In order to protect the physical health and economic well being of county residents and the citizens of our region, the Madison County Board of Commissioners joined the Mountain Area Early Action Compact and appointed the Madison County Air Quality Council. The purpose of the Council is to advise the Board of Commissioners of emissions reduction strategies that will aid achievement of health and economic goals and comply with requirements of the Mountain Area Early Action Compact.

The Council offered a list of proposed emissions reduction strategies to the County Manager in June 2003. Those proposals were reviewed locally and a list of proposed strategies was forwarded to the US Environmental Protection Agency and the NC Division of Air Quality on June 16, 2003.

During the fall of 2003, it was found that air quality in the region had improved to the point that member counties of the EAC were no longer at risk of the non-attainment designation. This news mitigated the immediate need to continue participation in the EAC for economic stability and development; however, concerns for public health and long-term economic development remain.

It should be noted that compliance with ozone standards is measured on a three year rolling average and that improved air quality in 2003 was in large part due to prevailing cool and wet summer weather. Such weather retards atmospheric chemical reactions that lead to formation of ground level ozone. Thus our attainment status is at best tenuous.

The Madison County Air Quality Council recommends that the Madison County Board of Commissioners continue to participate in the EAC voluntarily both as a means of improving air quality and to reflect good faith with our sister local, state and federal governments participating in the EAC. Since the area is presently attaining ozone air quality standards, the measures and actions proposed in this document are voluntary and will not become a part of any enforceable state or federal plan or proposal. By taking such action, Madison County will remain in a position to continue to use the Early Action Compact or similar legal devices to address non-attainment in the future.

Following is a restatement of the emissions reduction strategies submitted on June 30, 2003. A series of recommended action steps has been added to the document to guide implementation.

Recommended Emissions Reduction Strategies and Action Plan

1
Strategy

The Madison County Board of Commissioners should initiate an ongoing public education campaign to inform residents specifically about non-attainment of Federal Clean Air Act Ozone Standards and generally about the risks of air pollution. Educational programs should enable citizens to understand the negative effects of air pollution on public health and economic progress. Education should also equip the public with tools to make informed decisions regarding behaviors and choices that are consistent with improving air quality.

The county should explore opportunities to collaborate with state and local governments in educating the public. This will assure regional uniformity of message and may result in a better product at less expense than a singular effort.

The County should seek cooperation of local schools, businesses, news media and non-profit organizations to deliver educational messages to the citizens of Madison County.

Action step

Madison County should continue to participate in ongoing EAC wide plans for a joint educational effort to inform citizens of the problems associated with ozone and other air pollutants. Such education should target two goals: first to inform citizen discourse on matters of public policy related to air quality and second to equip citizens to make personal choices that will have a positive impact on air quality.

At a minimum, the county should develop and distribute printed informational materials through the Health Department, Building Permits office and other appropriate agencies. French Broad Electric Membership Corporation has agreed to make space available periodically in its monthly newsletter for air quality education. The Board of Commissioners should appoint an appropriate staff member to coordinate educational activities.

2
Strategy

The Madison County Board of Commissioners should encourage carpooling by working to establish the infrastructure necessary to facilitate communication among potential car-poolers. This should be done as a cooperative effort including nearby businesses and institutions, especially those that employ large workforces. Principles to guide the recommendation include:

A
The purchase of property for parking is, in our judgment, not feasible given current budget restraints.

B
A considerable amount of informal carpooling already exists among residents who work out-of-county. These individuals should be encouraged to participate in planning.

C
County evaluation of transportation projects should include advocacy of public parking facilities similar to the existing facility at the Mars Hill exit on Interstate 26.

D
The primary county responsibility should be to facilitate communication. The Council believes this can be accomplished substantially by use of existing resources. For example, the Mountain Area Information Network may be able to host a website to disseminate information on carpooling and facilitate user communication.

E
As carpooling grows, a secondary county responsibility should be to negotiate the use of private parking properties for daytime commuters. Liability will be an important issue in those negotiations.

F
As resources permit, the county should explore guaranteed-ride-home programs and emergency transportation for carpoolers.

Action Step

The Board of Commissioners should appoint and provide staff to a citizen task force to implement the strategies discussed above. The task force should have broad citizen representation and should target members that have familiarity with work place and employment issues.

3
Strategy

Madison County should appoint an Ozone Action Day Coordinator by adding that duty to a current staff member's responsibility. The main duties would include:

A
Informing citizens by web, recording or otherwise of Ozone Action Days. The state issues each day at 3PM during ozone season a forecast for the next day's ozone status. When ozone reaches elevated levels, an Ozone Action Day is declared to advise citizens of increased risk. There are about eight to ten Ozone Action Days annually.

B
The OAD Coordinator should serve as a point of contact for citizens requesting information regarding ozone and other air pollution concerns.

C
The OAD Coordinator should participate in state sponsored activities to learn about ozone and to coordinate local programs with statewide activities.

Action Step

It is suggested that the Board of Commissioners appoint a staff member, possibly within the Emergency Services Department or Health Department, to implement the above strategies. This position would become a major component of ongoing education and would alert residents to episodes of poor air quality. The OAD would be primarily responsible for the second educational goal mentioned above, namely, to help citizens understand the personal choices they can make to reduce pollution and cope with health problems associated with occurrences of poor air quality.

4
Strategy

Madison County should seek cooperation in emissions reduction and air pollution education from state and federal offices located in the county. Local business should also be encouraged to join.

Action Step

Assign this task to OAD Coordinator.

5
Strategy

Madison County should enact an ordinance banning open burning on Ozone Action Days. The Council realizes that burning bans can be controversial; however, this proposal would only apply for about eight to ten days each year. The days on which burning would be banned are those on which sensitive persons are most at risk. We believe that citizens will cooperate with a burning ban on days when it can have such a great effect on their neighbors.

Action Step

Assign study of an ordinance to the task force proposed above or to an already existing planning body.

These recommendations are respectfully submitted to the Madison County Board of Commissioners on March 8, 2004.

Members of the Madison County Air Quality Council

Anita Davie, former County Manager

David Allen, Community and Economic Development Manager

Gary Proffitt, Transportation Director, Madison County Board of Education

John Graeter, Director, Hot Springs health Program

Buck Wilson, Health Director, Madison County Health Department

Tony Webb, NC Forest Service

Phyllis Styles, Director of Corporate and Foundation Relations, Mars Hill College

Charles Tolley, General Manager, French Broad Electric Membership Corporation

Darhyl Boone, Town Manager, Mars Hill, NC

Jim Brown, Manager, Madison County Solid Waste Services

R. J. Plemmons, OA Gregory Oil Company

Debbie Ponder, Mayor, Hot Springs, NC

RESOLUTION NO. ________

RESOLUTION AUTHORIZING THE ADOPTION OF THE AIR QUALITY IMPROVEMENT INITIATIVE 2004 AS A TOOL TO IMPROVE AIR QUALITY IN THE CITY OF ASHEVILLE.

WHEREAS, the City of Asheville wishes to have good air quality; and

WHEREAS, the City of Asheville wishes to educate the public on ways to improve air quality; and

WHEREAS, the City of Asheville wishes to continue to be a desination for residents and visitors to enjoy the environment today and in years to come.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF ASHEVILLE THAT:

City Council approves the Air Quality Improvement Initiative 2004.

Read, approved and adopted this 23th day of March 2004.

___________________________ ______________________________

City Clerk Mayor

Approved as to form:

____

City Attorney

RESOLUTION # 04-03-09

RESOLUTION AUTHORIZING IMPLEMENTATION OF THE ASHEVILLE-BUNCOMBE COUNCIL OF THE MOUNTAIN AREA EARLY ACTION COMPACT RECOMMENDATIONS

Whereas, the County of Buncombe realizes that air quality has a direct effect on the health and economic well being of citizens, and

Whereas, the County of Buncombe entered into an agreement with six nearby local governments on December 17, 2002 to form the Mountain Area Early Action Compact to improve air quality, and

Whereas, the Mountain Area Early Action Compact governments have entered into an agreement with the NC Division of Air Quality and the US Environmental Protection Agency to improve air quality and avoid non-attainment of state and federal standards, and

Whereas, the Compact agreement requires that participating local governments develop pollution reduction strategies and report those strategies to state and federal authorities by March 31, 2004, and

Whereas, the Buncombe County Board of Commissioners and the City of Asheville Council have duly appointed the Asheville-Buncombe Council of the Mountain Area Early Action Compact as a citizens group to advise the governing boards, and

Whereas, the Board of Commissioners has received and reviewed the Council's recommendations.

NOW, THEREFORE, BE IT RESOLVED by the Board of Commissioners for the County of Buncombe as follows:

1 That this Board does hereby endorse and approve of the recommendations offered by the Asheville-Buncombe Council of the Mountain Area Early Action Compact.

2 That this Board directs the County Manager to implement the recommendations applicable to the County as soon as possible.

3 That this resolution be effective upon its adoption.

ADOPTED this the 16th day of March, 2004

ATTEST BOARD OF COMMISSIONERS FOR THE COUNTY OF BUNCOMBE

Kathy Hughes Nathan Ramsey

KATHY HUGHES, CLERK NATHAN RAMSEY, CHAIRMAN

APPROVED AS TO FORM

Joe Connolly

JOE CONNOLLY, COUNTY ATTORNEY

RESOLUTION

WHEREAS, the Haywood County Board of Commissioners approved on December 16, 2002 being a member government of the Early Action Compact comprised of Buncombe, Henderson, Madison, Transylvania, and Haywood Counties; and

WHEREAS, the Early Action Compact was established to enable the five counties to work together to improve air quality and possibly delay any determination that these counties are in non-attainment of EPA Ozone Air Quality guidelines; and

WHEREAS, Haywood County stakeholders developed a list of advisory local control measures for citizens, businesses and governmental units; and

WHEREAS, the Mountain Area Compact region has been determined by EPA to be in attainment for air quality at this time; and

WHEREAS, participation in the Early Action Compact is voluntary since the area is in attainment for ozone; and

WHEREAS, areas above 4,000 feet and the Great Smoky Mountains Park are considered in non-attainment due to transient air flow.

NOW, THEREFORE, BE IT RESOLVED by the Haywood County Board of Commissioners that Haywood County will voluntarily continue to participate in the Early Action Compact to improve air quality and to reflect good faith with our sister local, state, and federal governments participating in the Early Action Compact.

BE IT FURTHER RESOLVED by the Haywood County Board of Commissioners that the County Manager is hereby directed to carry out the strategies in the attached document.

THIS THE 15TH DAY OF MARCH, 2004.

/s/ Bill D. Noland
Bill D irman
Haywood County Board of Commissioners

Attest:

/s/ C. Jack Horton
C. Jack Horton, Clerk to the Board

STATE OF NORTH CAROLINA

Resolution

COUNTY OF MADISON

WHEREAS, the County of Madison has been a participant in the Mountain Early Action Compact consisting of Buncombe, Haywood, Henderson and Transylvania Counties; and

WHEREAS, Henderson County has chosen to withdraw from the Compact; and

WHEREAS, Madison County wishes to continue to participate in such a regional concept; and

WHEREAS, the local air quality council appointed by this Board has recommended that:

1. The County continue to participate in joint educational efforts to inform citizens of the problems associated with ozone and other air pollutants;

2. The County encourage car pooling;

3. That an ozone action day coordinator be appointed by adding that title and responsibility to someone already on the Board as a County employee; and

4. The County enact an ordinance banning open burning on ozone action days.

WHEREAS, the County Commissioners believe wholeheartedly in concepts 1, 2, and 3, but believe that concept 4 needs further evaluation;

WHEREFORE, the Madison County Board of Commissioners does hereby resolve:

1 To continue to participate in the Mountain Early Action Compact with the counties of Buncombe, Haywood and Transylvania.

2. That the County continue to participate in joint educational efforts to inform citizens of the problems associated with ozone and other air pollutants;

3. That the County encourage carpooling

4. That an ozone action day coordinator be appointed by adding that title and responsibility to someone already on the Board as an employee.

This the 8th day of March, 2004

MADISON COUNTY

By: ____________________
Vernon Ponder

ATTEST:

Larry Leake, Clerk

APPENDIX A

STAFF REPORT

TO: Mayor and City Council DATE: March 16, 2004 (worksession)
March 23, 2004 (formal)

VIA: Jim Westbrook, City Manager

FROM: Cathy Ball, P.E., City Engineer

SUBJECT: Air Quality Improvement Initiative 2004

SUMMARY STATEMENT: **The purpose of this report is to request City Council's approval on the Air Quality Improvement Initiative 2004 for the City of Asheville originally developed as the Early Action Compact.**

REVIEW: In December 2002, City Council adopted a resolution to enter into an Early Action Compact (EAC) along with Buncombe County and other local governments. The first step in the process was to develop a list of measures that can be taken by each of the local governments to reduce air pollution. In an effort to develop this list, EPA recommended that a group of stakeholders be created to make recommendations to local governments. City Council reviewed and approved the list of stakeholders in March 2003.

Due to the differences in size and economic base, it was agreed that each county would identify local control measures individually. This process allows greater stakeholder participation and allows each jurisdiction to evaluate local resources and determine if county-specific control measures can reasonably be implemented.

This group of stakeholders representing the City of Asheville and Buncombe County developed the attached list. This list was presented to City Council in June 2003. Since that time, no major changes in the measures has been made by the stakeholders.

Since the June 2003 update to City Council, the City has received information that indicates that our area will not be considered for non-attainment status in the next review largely due to the wet summer and fall we experienced in 2003 as well as some major changes that Progress Energy is making in their process at the Lake Julian site.

The stakeholders met to discuss this issue and recommend that the City approve this plan as an effort to improve air quality regardless of the threat of becoming non-attainment. The stakeholders indicated that they would like to see a more aggressive approach to improving air quality particularly in the area of educating the public of measures they can take to reduce pollutants.

Buncombe County along with the City of Asheville held a public meeting on January 8, 2004 to solicite input on the plan. The comments were good but many participants requested that the measures in the plan be mandatory as opposed to optional.

CHALLENGES AND BENEFITS

The Southern Environmental Law Center has indicated, as described in the attached letter, they will file suit against EPA if they allow communities to use the Early Action Compact as a method of avoiding non-attainment status. EPA has indicated they will not challenge this suit. This means that adopting an Early Action Compact may not allow communities to avoid the non-attainment designation. This area is not affected by this challenge because we would not be considered for non-attainment status for the reasons described above. For that reason many of the counties in the surrounding area have chosen not to adopt an air quality improvement plan.

Rather than passing this plan as an "Early Action Compact" Plan, staff recommends that we refer to it as an "Air Quality Improvement Initiative 2004" to avoid any possibility of being involved in the possible law suit mentioned above.

Most of the measures in the imitative do not cost money, they simply state that we will try to take measures that have been proven to reduce pollutants. The only initiative that cost money is developing and implementing an educational/public relations plan. The Engineering Department has requested $15,000 in the FY 2004-05 Budget to cover these expenses.

RECOMMENDATION: Staff recommends that City Council adopt the attached Plan under the title of Air Quality Improvement Initiative 2004 to improve air quality in the City.

Attachments:
(1) Resolution
(2) Air Quality Improvement Initiative 2004
(3) Letter to EPA from the Southern Environmental Law Center

APPENDIX B

Signed copies of resolutions are available on request, in some cases official copies are not published until minutes are approved at a subsequent meeting. Resolutions are in effect as of the dates in March, 2004 indicated.

Appendix C

Portions of this document were produced by the NC Division of Air Quality. Those comments are attached separately. File compatibility problems precluded linking into a master document.

Attachments

1 INTRODUCTION

1.1 Background

As a requirement of the Mountain Early Action Compact (EAC), the Local Early Action Plan (Local EAP) due March 31, 2004, must include measures that are specific, quantified, permanent and enforceable as part of the SIP or TIP once approved by EPA. The Local EAP also details specific implementation dates for adopted local controls. This report includes updated air quality emission inventories and modeling results for future year 2010 in Sections 4 and 6. Also included in this report is an overview of the air quality in the Mountain area, the health effects and sources of ozone, Federal and State control measures, and emissions modeling and results. The Mountain area includes Buncombe, Haywood, Henderson, Madison and Transylvania Counties.

1.2 Modeling Background

The modeling analysis is a complex technical evaluation that begins by selection of the modeling system and selection of the meteorological episodes. North Carolina Division of Air Quality (NCDAQ) decided to use the following modeling system:

- Meteorological Model: MM-5 – This model generates hourly meteorological inputs for the emissions model and the air quality model, such as wind speed, wind direction, and surface temperature.

- Emissions Model: Sparse Matrix Operator Kernel Emissions (SMOKE) - This model takes daily county level emissions and temporally allocates across the day, spatially locates the emissions within the county, and transfers the total emissions into the chemical species needed by the air quality model.

- Air Quality Model: MAQSIP (Multi-Scale Air Quality Simulation Platform) – This model takes the inputs from the emissions model and meteorological model and predicts ozone hour by hour across the modeling domain, both horizontally and vertically.

The modeling system being used for this demonstration and the episodes being modeled were discussed in detail in the June 30, 2003 progress report (see Appendix B).

The following historical episodes were selected to model because they represent typical meteorological conditions in North Carolina when high ozone is observed throughout the State:

- July 10-15, 1995
- June 20-24, 1996
- June 25-30, 1996
- July 10-15, 1997

The meteorological inputs were developed using MM5 and area discussed in detail in Appendix B.

The precursors to ozone, Nitrogen Oxides (NOx), Volatile Organic Compounds (VOCs), and Carbon Monoxide (CO) were estimated for each source category. These estimates were then spatially allocated across the county, temporally adjusted to the day of the week and hour of the day and speciated into the chemical species that the air quality model needs to predict ozone. The emission inventories used for the current year and future year modeling are discussed in detail in Section 4.

The State, Federal and Local control measures currently in practice and those being implemented in the future to reduce point and mobile (highway and nonroad) source emissions are discussed in Section 5.

The status of the modeling work is discussed in Section 6.

1.3 Stakeholder Involvement

EACs incorporate detailed discussion of the "Stakeholders Involvement"

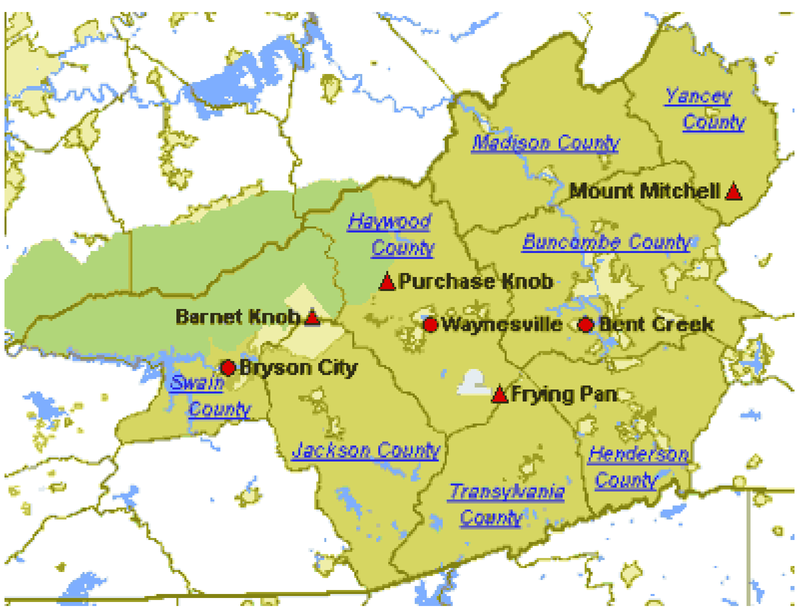
2 Overview of Air Quality In The Mountain Area

The U.S. Environmental Protection Agency (EPA), under the authority of the Federal Clean Air Act, regulates outdoor air pollution in the United States. The EPA sets National Ambient Air Quality Standards (NAAQS) for six "criteria pollutants" that are considered harmful to human health and the environment.[1] These six pollutants are carbon monoxide, lead, ozone, nitrogen dioxide, particulate matter and sulfur dioxide. Particulate matter is further classified into two categories: PM 10, or particles with diameters of 10 micrometers or less, and fine particulate (PM 2.5), particles with diameters of 2.5 micrometers or less. Levels of a pollutant above the health-based standard pose a risk to human health.

The NCDAQ monitors levels of all six criteria pollutants in the Mountain area and reports these levels to the EPA. According to the most recent data, the Mountain area is meeting national ambient standards for five of the pollutants, but is not meeting the Federal 8-hour standard for ground-level ozone. Federal enforcement of the ozone NAAQS is based on a 3-year monitor "design value". The design value for each monitor is obtained by averaging the annual fourth highest daily maximum 8-hour ozone values over three consecutive years. If a monitor's design value exceeds the NAAQS, that monitor is in violation of the standard. The EPA may designate part or all of the metropolitan statistical area (MSA) as nonattainment even if only one monitor in the MSA violates the NAAQS.

There are four ozone monitors in Mountain EAC area. These monitors are: Bent Creek, located in Buncombe County; and Purchase Knob, Waynesville and Fry Pan, all located in Haywood County. The location of these monitors are shown in Figure 2-1.

Figure 2-1: Mountain EAC Area's Ozone Monitor



For the 3-year period 2000 – 2002, all but one monitor, Waynesville, was violating the 8-hour ozone NAAQS. However, the most recent 3-year period 2001 – 2003, all but one monitor, Purchase Knob, is now attaining the 8-hour ground-level ozone NAAQS, see Table 2-1. Purchase Knob continues to marginally violate the standard. The historical ozone monitoring data, including the years which the design values are based on, is listed in Table 2.2. Monitor design values are dependant on which three year period the 4th highest 8-Hour ozone concentrations are averaged. Data gaps in early year in Table 2.2 mean monitors were not installed during these years.

Table 2-1: Ozone Monitor Design Values in parts per million (ppm)

Monitor Name	County	00-02	01-03
Bent Creek	Buncombe	0.085	0.079
Fry Pan	Haywood	0.085	0.082
Purchase Knob	Haywood	0.087	0.085
Waynesville	Haywood	0.080	0.079

Table 2.2 Historical 4th Highest 8-Hour ozone values (1994-2003)

Monitor Site	4th Highest 8-Hour Ozone Values (ppm)									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Bent Creek	0.069	0.076	0.074	0.075	0.090	0.084	0.090	0.076	0.090	0.071
Fry Pan	0.066	0.085	0.086	0.085	0.102	0.096	0.085	0.081	0.090	0.077
Purchase Knob		0.085	0.078	0.087	0.092	0.093	0.087	0.082	0.094	0.080
Waynesville						0.082	0.083	0.075	0.084	0.079

NCDAQ forecasts ozone levels on a daily basis from May 1 – September 30 for Mountain EAC area. This forecast is issued to the public using EPA's Air Quality Index (AQI) color code system. Table 2-3 lists the ozone regulatory standard and AQI breakpoints with their corresponding health risks.

Table 2-3: Air Quality Index Color Code System

		Pollutant concentration (ppm) ranges for AQI color codes				
Pollutant/ Standard	**Standard Value**	**Green AQI 0– 50 Good**	**Yellow AQI 51-100 Moderate**	**Orange AQI 101-150 Unhealthy for Sensitive Groups**	**Red AQI 151-200 Unhealthy**	**Purple AQI 201-300 Very Unhealthy**
Ozone/ 8-hour average	0.08 ppm averaged over 8 hours	0-0.064	0.065-0.084	0.085-0.104	0.105-0.124	0.125-0.374

The AQI color codes standardize the reporting of different pollutants by classifying pollutant concentrations according to relative health risk, using colors and index numbers to describe pollutant levels. The AQI is also used to report the previous day's air quality to the public. In the Mountain area, the forecast and previous day air quality reports appear on the weather page of local newspapers and NCDAQ's website: http://daq.state.nc.us/airaware/forecast. Additionally, the ozone forecast is broadcasted during the local news on television and radio.

3 Ozone And Its Health Effects And Sources

3.1 Overview of Ozone

Ozone (O_3) is a tri-atomic ion of oxygen. In the stratosphere or upper atmosphere, ozone occurs naturally and protects the Earth's surface from ultraviolet radiation. Ozone in the lower atmosphere is often called ground-level ozone, tropospheric ozone, or ozone pollution to distinguish is from upper-atmospheric or stratospheric ozone. Ozone does occur naturally in the lower atmosphere (troposphere), but only in relatively low background concentrations of about 30 parts per billion (ppb), well below the NAAQS. The term "smog" is also commonly used to refer to ozone pollution. Although ozone is a component of smog; smog is a combination of ozone and airborne particles having a brownish or dirty appearance. It is possible for ozone levels to be elevated even on clear days with no obvious "smog".

In the lower atmosphere, ozone is formed when airborne chemicals, primarily nitrogen oxides (NOx) and volatile organic compounds (VOCs), combine in a chemical reaction driven by heat and sunlight. These ozone-forming chemicals are called precursors to ozone. Man-made NOx and VOC precursors contribute to ozone concentrations above natural background levels. Since ozone formation is greatest on hot, sunny days with little wind, elevated ozone concentrations occur during the warm weather months, generally May through September. In agreement with EPA's guidance, North Carolina operates ozone monitors from April 1 through October 31 to be sure to capture all possible events of high ozone.

3.2 Ozone Health Effects

The form of oxygen we need to breathe is O_2. When we breathe ozone, it acts as an irritant to our lungs. Short-term, infrequent exposure to ozone can result in throat and eye irritation, difficulty drawing a deep breath, and coughing. Long-term and repeated exposure to ozone concentrations above the NAAQS can result in reduction of lung function as the cells lining the lungs are damaged. Repeated cycles of damage and healing may result in scarring of lung tissue and permanently reduced lung function. Health studies have indicated that high ambient ozone concentrations may impair lung function growth in children, resulting in reduced lung function in adulthood. In adults, ozone exposure may accelerate the natural decline in lung function that occurs as part of the normal aging process. Ozone may also aggravate chronic lung diseases such as emphysema and bronchitis and reduce the immune system's ability to fight off bacterial infections in the respiratory system.

Asthmatics and other individuals with respiratory disease are especially at risk from elevated ozone concentrations. Ozone can aggravate asthma, increasing the risk of asthma attacks that require a doctor's attention or the use of additional medication. According to the EPA, one reason for this increased risk is that ozone increases susceptibility to allergens, which are the most common triggers for asthma attacks. In addition, asthmatics are more severely affected by the reduced lung function and irritation that ozone causes in the respiratory system. There is increasing evidence that ozone may trigger, not just exacerbate, asthma attacks in some individuals. Ozone may also contribute to the development of asthma. A recent study published in the British medical journal *The Lancet* found a strong association between elevated ambient ozone levels and the development of asthma in physically active children.[2]

All children are at risk from ozone exposure because they often spend a large part of the summer playing outdoors, their lungs are still developing, they breathe more air per pound of body weight, and they are less likely to notice symptoms. Children and adults who frequently exercise outdoors are particularly vulnerable to ozone's negative health effects, because they may be repeatedly exposed to elevated ozone concentrations while breathing at an increased respiratory rate.[3]

3.3 Ozone Sources

Ozone-forming pollutants, or precursors, are nitrogen oxides (NOx) and volatile organic compounds (VOCs).

3.3.1 Volatile Organic Compounds

Volatile organic compounds (VOCs) are a class of hydrocarbons, and therefore are sometimes referred to as hydrocarbons. However, it is important to note that hydrocarbons, as a class of chemical compounds, include less-reactive compounds not considered VOCs. In other words, although all VOCs are hydrocarbons, not all hydrocarbons are VOCs.

In North Carolina, large portions of precursor VOCs are produced by natural, or biogenic, sources, which are primarily trees. Man-made, or anthropogenic, VOCs also contribute to ozone production, particularly in urban areas. Sources of anthropogenic VOCs include unburned gasoline fumes evaporating from gas stations and cars, industrial emissions, and consumer products such as paints, solvents, and the fragrances in personal care products.

3.3.2 Nitrogen Oxides

Nitrogen oxides (NOx) are produced when fuels are burned, and result from the reaction of atmospheric nitrogen at the high temperatures produced by burning fuels. Power plants, highway motor vehicles, the major contributor in urban areas, and off-road mobile source equipment, such as construction equipment, lawn care equipment, trains, boats, etc., are the major sources of NOx.

Other NOx sources include "area" sources (small, widely-distributed sources) such as fires (forest fires, backyard burning, house fires, etc.), and natural gas hot water heaters. Other residential combustion sources such as oil and natural gas furnaces and wood burning also produce NOx, but these sources generally do not operate during warm-weather months when ground-level ozone is a problem. In general, area sources contribute only a very small portion of ozone-forming NOx emissions.

Generally, North Carolina, including the Mountain area, is considered "NOx-limited" because of the abundance of VOC emissions from biogenic sources. Therefore, current ozone strategies focus on reducing NOx. However, VOC reduction strategies, such as control of evaporative emissions from gas stations and vehicles, could reduce ozone in urban areas where the biogenic VOC emissions are not as high.

3.3.3 Sources of NOx and VOCs

The following lists the sources, by category, what contribute to NOx and VOC emissions.

Biogenic: Trees and other natural sources.

Mobile: Vehicles traveling on paved roads: cars, trucks, buses, motorcycles, etc.

Nonroad: Vehicles not traveling on paved roads: construction, agricultural, and lawn care equipment, motorboats, locomotives, etc.

Point: "Smokestack" sources: industry and utilities.

Area: Sources not falling into above categories. For VOCs, includes gas stations, dry cleaners, print shops, consumer products, etc. For NOx, includes forest and residential fires, natural gas hot water heaters, etc.

4 Emissions Inventories

4.1 Introduction

Emissions modeling performed by NCDAQ estimates NOx and VOC emissions for an average summer day, given specific meteorological and future year conditions and using emission inputs based on emission inventories that include anticipated control measures. The biogenic emissions are kept at the same level as the episodic biogenic emissions since these emissions are based on meteorology and the meteorological conditions in the future years are kept the same as the episodic meteorology.

There are various types of emission inventories. The first is the base year or episodic inventory. This inventory is based on the year of the episode being modeled and is used for validating the photochemical model performance.

The second inventory used in this project is the "current" year inventory. For this modeling project it will be the 2000 emission inventory, which is the most current. This inventory is processed using all of the different meteorological episodes being studied. The photochemical modeling is processed using the current year inventory and those results are used as a representation of current air quality conditions for the meteorological conditions modeled.

Next is the future base year inventory. For this type, an inventory is developed for some future year for which attainment of the ozone standard is needed. The future base year projections for 2007 take into account all State and Federal control measures expected to operate at that time, including Federal vehicle emissions controls, NOx SIP Call controls, and North Carolina Clean Smokestacks controls. For this modeling project the attainment year is 2007 and the additional years for which a showing of continued maintenance of the 8-hour ozone standard are 2012 and 2017. An additional year, 2010, was modeled since this is the year for which the Charlotte/Gastonia and Raleigh/Durham areas must demonstrate attainment of the 8-hour ozone standard. It is the future base year inventories that control strategies and sensitivities are applied to determine what controls, to which source classifications, must be made in order to attain the ozone standard.

The base year inventories used for each source classifications are discussed in Appendix B. In the sections that follow, the inventories used for the current and the future years are discussed. Emission summaries by county for 2000 and 2007 (entire State) are in Appendix A.

4.2 Current Year Inventories

For the large utility sources, year specific Continuous Emissions Monitoring (CEM) data is used for base year episode specific modeling. However, it did not make sense to use 2000 CEM data for the current year inventory since the meteorology used for the current year modeling runs are the 1995, 1996, and 1997 episode specific meteorology. The concern is that the utility day specific emissions for 2000 would not correspond to the meteorology used in the modeling. After discussing this issue with EPA, the decision was made to continue to use the episodic CEM data for the current year inventory. Since only CEM NOx emissions are reported to the EPA, Acid Rain Division (ARD), the CO and VOC emissions are calculated from the NOx emissions using emission factor ratios (CO/NOx and VOC/NOx) for the particular combustion processes at the utilities.

The inventory used to model the other point sources is the 1999 National Emissions Inventory (NEI) release version 2.0 obtained from the EPA's Clearinghouse for Inventories and Emission Factors (CHIEF) website (http://www.epa.gov/ttn/chief/net/1999inventory.html). In addition, North Carolina emissions for forest fires and prescribed burns are treated as point sources and are episode specific similar to CEM data. These emissions were kept the same as the episodic emissions.

Similar to the other point source emissions inventory, the inventory used to model the stationary area sources is the 1999 NEI release version 2.0 obtained from the EPA's CHIEF website. The exception to this is for North Carolina where a 2000 current year inventory was generated by NCDAQ following the current methodologies outlined in the Emissions Inventory Improvement Program (EIIP) Area Source Development Documents, Volume III (http://www.epa.gov/ttn/chief/eiip/techreport/volume03/index.html).

For the nonroad mobile sources that are calculated within the NONROAD mobile model, a 2000 current year inventory was generated for the entire domain. The model version used is the Draft NONROAD2002 distributed for a limited, confidential, and secure review in November 2002. A newer draft version of this model (NONROAD2002a) was released by the EPA in June 2003. A comparison was done between the results from the two models and the differences were not significant for NOx emissions, however they were large for CO. Since CO does not play a large role in ozone formation, it is not believed that these differences will impact the ozone concentrations in the air quality model. However, since there are differences, when the final State Implementation Plan (SIP) modeling is carried out the updated emissions will be used.

The nonroad mobile sources not calculated within the NONROAD model include aircraft engines, railroad locomotives and commercial marine vessels. The 2000 current year inventory used for these sources is the 1999 NEI release version 2.0 obtained from the EPA's CHIEF website. The exception to this is for North Carolina where a 2000 current year inventory was generated by NCDAQ following the methodologies outlined in the EPA guidance document EPA-450/4-81-026d (Revised), Procedures for Inventory Preparation, Volume IV: Mobile Sources.

In order to accurately model the mobile source emissions in the EAC areas, the newest version of the MOBILE model, MOBILE6.2, was used. This model was released by EPA in 2002 and differs significantly from previous versions of the model. Key inputs for MOBILE include information on the age of vehicles on the roads, the speed of those vehicles, what types of road those vehicles are traveling on, any control technologies in place in an area to reduce emissions for motor vehicles (e.g., emissions inspection programs), and temperature. The development of these inputs is discussed in Appendix B.

Biogenic emissions used in the 2000 current year modeling are the same as those used in the base year episodic modeling. This is due to the use of the same meteorology for the current year modeling runs. The development of this source category is discussed in Appendix B.

The emissions summary for the 2000 current year modeling inventories for the Mountain EAC area is listed in Table 4.2-1. These emissions represent typical weekday emissions and are reported in tons per day.

Table 4.2-1 2000 Current Year Modeling Emissions

Source	CO	NOX	VOC
Point	10	71	15
Area	16	1	16
Nonroad Mobile	109	9	12
Highway Mobile	303	52	26
Biogenic	0	0.5	281
Total Emissions	438	134	350

4.3 Future Year Inventories

The inventory used for the preliminary 2007 point source inventory is the EPA's May 1999 release of the NOx SIP call future year modeling foundation files, obtained from the EPA Office of Air Quality Planning and Standards (OAQPS). This is a 2007 emissions inventory, projected from a 1995 base year inventory and controlled in accordance to the NOx SIP call rule. The decision to use this inventory for initial 2007 future year modeling runs was made since all of the point sources required to have controls due to the NOx SIP call rule making are reflected in this inventory. The exception to this is for North Carolina. For the major North Carolina utility sources, NCDAQ obtained estimated future year hour specific data for the two largest utility companies within North Carolina, Duke Energy and Progress Energy. Additionally, the day specific forest fires and prescribed fires inventory were the episodic emissions.

The final modeling run for the 2007 future year point source inventory uses the EPA's 1999 NEI inventory grown to 2007 using growth factors from the EPA's Economic Growth Analysis System (EGAS) version 4.0. The exception to this is for North Carolina, where State specific growth factors, and where available source specific growth factors, were used to grow the North Carolina 1999 inventory. Additionally, NCDAQ created a new control file that reflect how the states surrounding North Carolina plan to implement the NOx SIP call rule as well as all other rules that are on the books. The 2012 future year point source inventory was generated using this same methodology.

The inventory used to model the stationary area sources for 2007 and 2012 is the 1999 NEI release version 2.0 obtained from the EPA's CHIEF website and were grown to 2007 using growth factors from the EPA's Economic Growth Analysis System (EGAS) version 4.0. The exception to this is for North Carolina, where the 2000 current year inventory was grown using a mixture of EGAS growth factors and state-specific growth factors for the furniture industry.

For the nonroad mobile sources that are calculated within the NONROAD mobile model, a 2007 and 2012 future years inventories were generated for the entire domain using the same model used to generate the current year inventory. In the final modeling, the NONROAD2002a model will be used to create the nonroad inventory. The remaining nonroad mobile source categories, the 1999 NEI release version 2.0 obtained from the EPA's CHIEF website and were grown to 2007 and 2012 using growth factors from the EPA's Economic Growth Analysis System (EGAS) version 4.0. The exception to this is for North Carolina, where the 2000 current year inventory was grown with EGAS growth factors.

The same MOBILE model was used to create the 2007 and 2012 future years highway mobile source inventories. The vehicle miles traveled (VMT) were projected using the methodologies prescribed by EPA. The exception to this was for North Carolina. In the urban areas of North Carolina VMT from travel demand models (TDM) for future years was available. The future years VMT were estimated by interpolating between the TDM future year estimates. Additionally, estimated future year speeds were obtained from the North Carolina Department of Transportation (NCDOT).

Biogenic emissions used in the future years modeling are the same as those used in the base year episodic modeling. This is due to the use of the same meteorology for the future year modeling runs. The development of this source category is discussed in Appendix B.

The emissions summary for the 2007 and 2012 future years modeling inventories for the Mountain EAC area is listed in Table 4.3-1. These emissions represent typical weekday emissions and are reported in tons per day.

Table 4.3-1 Future Year Modeling Emissions

Source	**2007**			**2012**		
	CO	**NOX**	**VOC**	**CO**	**NOX**	**VOC**
Point	23	37	13	32	31	16
Area	16	2	17	17	2	18
Nonroad Mobile	131	8	14	137	8	13
Highway Mobile	178	35	16	119	17	10
Biogenic	0	0.5	281	0	0.5	281
Total Emissions	348	83	341	305	58.5	338

Note that in the maintenance year 2012 the emissions are expected to be lower than the attainement year 2007, therefore continued maintenance of the 8-hour ozone standard is expected.

4.4 Comparison of 2000 and 2007 Inventories

The total predicted NOx emissions for the Mountain area decreased by 39%, from 134 tons per day (TPD) in 2000 to 83 TPD in 2007. This data is tabulated in Table 4.4-1. This same data is displayed in Figures 4.4-1 and 4.4-2 as pie charts with the percent contribution by each source category.

Table 4.4-1: Estimated NOx and VOC emissions, in tons per day

Source	NOx Emissions		VOC Emissions	
	2000	2007	2000	2007
Point	71	37	15	13
Area	1	2	16	17
Nonroad	9	8	12	14
Mobile	52	35	26	16
Biogenic	0.5	0.5	281	281
Total Emissions	2134	2090	2350	2348

Figure 4.4-1: 2000 Mountain Area NOx Emissions by Source

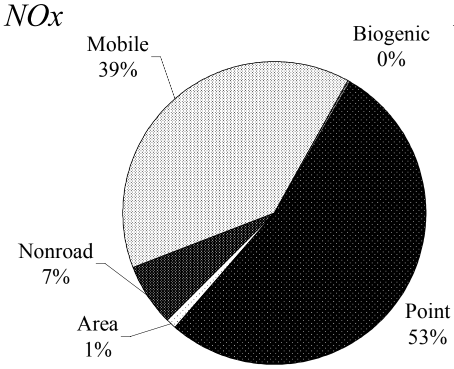
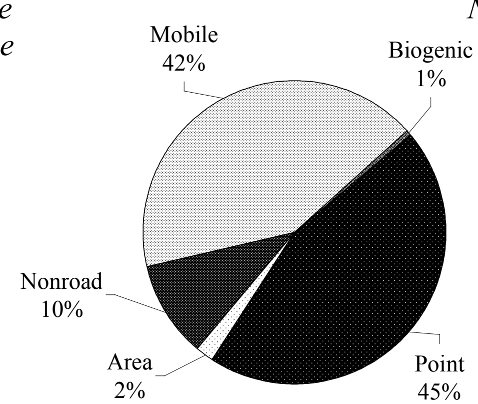


Figure 4.4-2: 2007 Mountain Area NOx Emissions by Source



The total predicted VOC emissions for the Mountain area decreased by 3%, from 350 TPD in 2000 to 341 TPD in 2007. This data is also tabulated in Table 4.4-1. This same data is displayed in Figures 4.4-3 and 4.4-4 as pie charts with the percent contribution by each source category.

Figure 4.4-3: 2000 Mountain Area VOC Emissions by Source

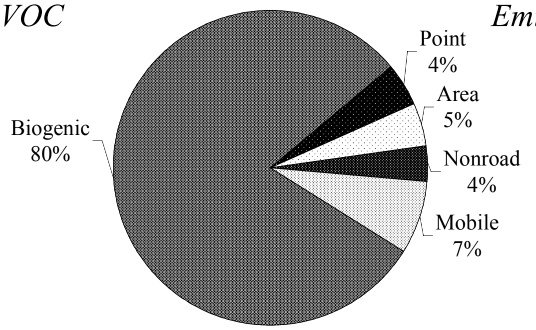
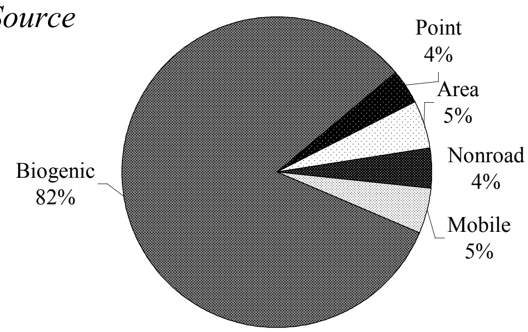


Figure 4.4-4: 2007 Mountain Area VOC Emissions b



There are few VOC control measures expected for area and point sources in the Mountain area, resulting in little or no decrease in emissions. However, the Mountain area contains a power plant, resulting in the point source NOx emissions decrease significantly due to the NOx SIP Call rule. Additionally, there are significant decreases in both highway and nonroad mobile source VOC and NOx emissions. Thus the overall region has a decrease in both NOx and VOC emissions.

For both, highway and nonroad mobile sources, diesel vehicles contribute the majority of NOx emissions. Figures 4.4-5 and 4.4-6 show the relative contributions of vehicle types for the highway mobile source category in 2000 and 2007 for the Mountain area. As shown in these figures, the relative contributions from vehicle types change slightly between 2000 and 2007, with heavy duty diesel vehicles still contributing more than 60% of the overall emissions. The estimated emissions for each vehicle type is tabulated in Table 4.4-2.

Figure 4.4-5: 2000 Mountain Area Highway Mobile NOx Sources

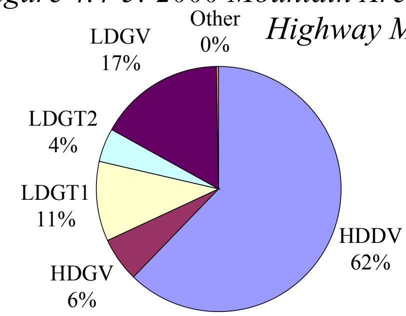
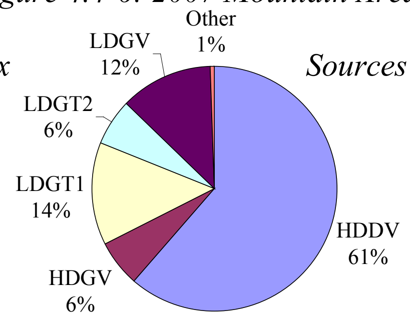


Figure 4.4-6: 2007 Mountain Area Highway Mobile NOx Sources



HDDV = Heavy-duty diesel vehicles (trucks)
HDGV = Heavy-duty gasoline vehicles (trucks)
LDGT (1&2) = Light-duty gasoline trucks
LDGV = Light-duty gasoline vehicles
Other = Motorcycles, light-duty diesel vehicles & trucks

Table 4.4-2: Estimated Highway NOx Emissions, by vehicle type

Source	NOx Emissions in TPD	
	2000	2007
Heavy-duty diesel vehicles	32.4	21.2
Light-duty gasoline vehicles	2.9	2.1
Light-duty gasoline trucks(1)	5.6	4.7
Light-duty gasoline trucks(2)	2.3	2.1
Heavy-duty gasoline vehicles	8.6	4.2
Other	0.2	0.2

Total	52.0	34.5

Figures 4.4-7 and 4.4-8 show the relative contributions of equipment types for the nonroad mobile source category in 2000 and 2007 for the Mountain area. As can be seen in these figures, diesel construction equipment contributes the majority of the nonroad mobile source NOx emissions for both years.

Figure 4.4-3: 2000 Mountain Area Nonroad Equipment NOx sources

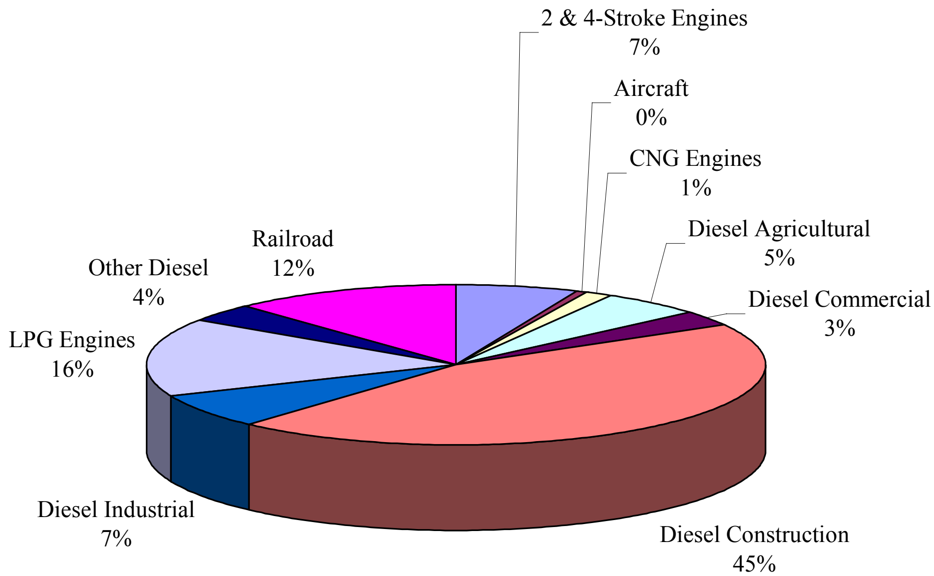
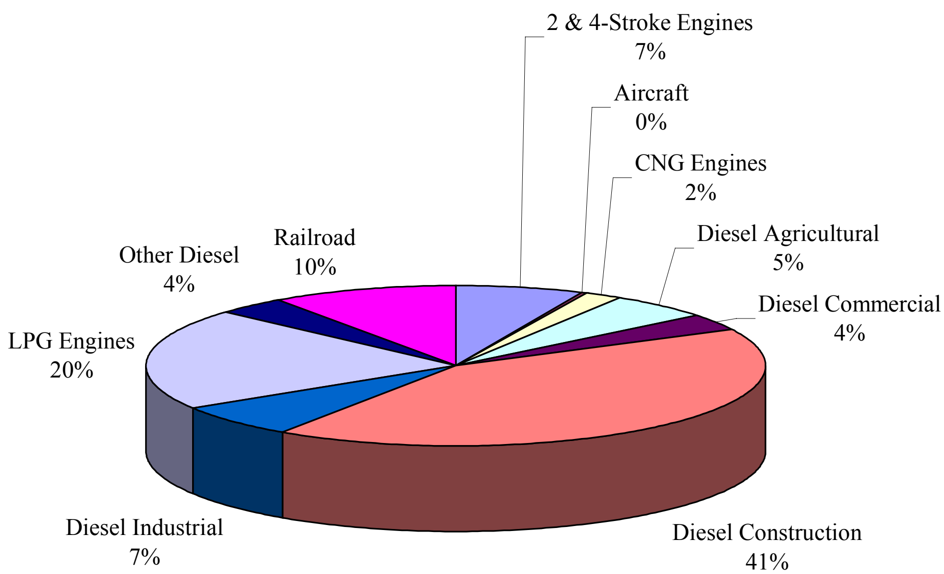


Figure 4.4-4: 2007 Mountain Area Nonroad Equipment NOx sources



4.5 Comparison of 2000 and 2010 Inventories

North Carolina developed the 2010 future year emissions inventory as an intermediate year between 2007, where attainment of the 8-hr Ozone standard is to be demonstrated, and 2012 where continued maintenance of the standard is required. This year was chosen since it is the year that the Charlotte/Gastonia area must show attainment of the 8-hour ozone standard.

The inventory used for the 2010 point source inventory is EPA's 2010 emission inventory used for their heavy duty diesel rule making. The decision to use this inventory for the 2010 future year modeling runs was made since all of the point sources required to have controls due to the NOx SIP call rule making are reflected in this inventory. The exception to this is for North Carolina. For the major North Carolina utility sources, NCDAQ obtained estimated future year hour specific data for the two largest utility companies within North Carolina, Duke Energy and Progress Energy. Additionally, the day specific forest fires and prescribed fires inventory were the episodic emissions.

The inventory used to model the stationary area sources is also the EPA's emission inventory used for the heavy duty diesel engine rule making. The exception to this is for North Carolina, where the 2000 current year inventory was grown using a mixture of EGAS growth factors and state-specific growth factors for the furniture industry.

For the nonroad mobile sources that are calculated within the NONROAD mobile model, a 2010 future year inventory was generated for the entire domain using the same model used to generate the current year inventory. The remaining nonroad mobile source categories, EPA's 2010 emission inventory used for their heavy duty diesel engine rule making was used.

The same MOBILE model was used to create the 2010 future year highway mobile source inventory. The vehicle miles traveled (VMT) were projected using the methodologies prescribed by EPA. The exception to this was for North Carolina. In the urban areas of North Carolina VMT from travel demand models (TDM) for future years was available. The 2010 VMT was estimated by interpolating between the TDM future year estimates. Additionally, estimated future year speeds were obtained from the North Carolina Department of Transportation (NCDOT).

Biogenic emissions used in the 2010 future year modeling are the same as those used in the base year episodic modeling. This is due to the use of the same meteorology for the future year modeling runs.

The emissions summary for the 2010 future year modeling inventories for the Mountain EAC area is listed in Table 4.5-1. These emissions represent typical weekday emissions and are reported in tons per day.

Table 4.5-1: Estimated NOx and VOC emissions, in tons per day

Source	NOx Emissions			VOC Emissions		
	2000	2007	2010	2000	2007	2010
Point	71	37	26	15	13	12
Area	1	2	2	16	17	18
Nonroad	9	8	9	12	14	15
Mobile	52	35	22	26	16	12
Biogenic	0.5	0.5	0.5	281	281	281
Total Emissions	2134	2090	60	2350	2348	338

The total predicted NOx emissions for the Mountain EAC area decreased by ~55%, from 134 tons per day (TPD) in 2000 to 60 TPD in 2010. The total predicted VOC emissions for the Mountain EAC area decreased by ~3%, from 350 TPD in 2000 to 338 TPD in 2010. The 2010 mobile emissions show a continuing decrease even from the 2007 emission levels for both NOx and VOC.

4.5 2017 Future Year Inventory

The State is in the process of developing the 2017 future year emission inventories for purposes of showing continued maintenance of the 8-hour ozone standard. The air quality modeling runs will be completed in the next couple of months and will be part of the final State submittal in December 2004.

5 Control Measures

Several control measures already in place or being implemented over the next few years, will reduce point, highway mobile, and nonroad mobile sources emissions. These control measures were modeled for 2007 and are discussed in the Sections below.

5.1 State Control Measures

5.1.1 Clean Air Bill

The 1999 Clean Air Bill expanded the vehicle emissions inspection and maintenance program from 9 counties to 48, phased in between July 1, 2002 through January 1, 2006. Vehicles will be tested using the onboard diagnostic system, an improved method of testing, which will indicate NOx emissions, among other pollutants. The previously used tailpipe test did not measure NOx. The inspection and maintenance program will be phased in from July 1, 2004 through July 1, 2005, in the Mountain area. Table 5.1.1-1 lists the phase in dates for the Mountain area.

Table 5.1.1-1 Phase-In Dates for the Mountain Area

County	Phase-In Date
Buncombe	July 1, 2004
Haywood	July 1, 2005
Henderson	July 1, 2005

5.1.2 NOx SIP Call Rule

North Carolina's NOx SIP Call rule will reduce summertime NOx emissions from power plants and other industries by 68% by 2006. The North Carolina Environmental Management Commission adopted rules requiring the reductions in October 2000.

5.1.3 Clean Smokestacks Act

In June 2002, the N.C. General Assembly enacted the Clean Smokestacks Act, requiring coal-fired power plants to reduce annual NOx emissions by 78% by 2009. These power plants must also reduce annual sulfur dioxide emissions by 49% by 2009 and by 74% in 2013. The Clean Smokestacks Act could potentially reduce NOx emissions beyond the requirements of the NOx SIP Call Rule. One of the first state laws of its kind in the nation, this legislation provides a model for other states in controlling multiple air pollutants from old coal-fired power plants.

5.1.4 Open Burning Bans

In June 2004, the Environmental Management Commission should approve a new rule that would ban open burning during the ozone season on code orange and code red ozone action days for those counties that NCDAQ forecasts ozone. NCDAQ will determine what rule penetration and rule effectiveness would be most appropriate to use for this rule.

5.2 Federal Control Measures

5.2.1 Tier 2 Vehicle Standards

Federal Tier 2 vehicle standards will require all passenger vehicles in a manufacturer's fleet, including light-duty trucks and Sports Utility Vehicles (SUVs), to meet an average standard of 0.07 grams of NOx per mile. Implementation will begin in 2004, and most vehicles will be phased in by 2007. Tier 2 standards will also cover passenger vehicles over 8,500 pounds gross vehicle weight rating (the larger pickup trucks and SUVs), which are not covered by current Tier 1 regulations. For these vehicles, the standards will be phased in beginning in 2008, with full compliance in 2009. The new standards require vehicles to be 77% to 95% cleaner than those on the road today. Tier 2 rules will also reduce the sulfur content of gasoline to 30 ppm by 2006. Most gasoline currently sold in North Carolina has a sulfur content of about 300 ppm. Sulfur occurs naturally in gasoline but interferes with the operation of catalytic converters in vehicle engines resulting in higher NOx emissions. Lower-sulfur gasoline is necessary to achieve Tier 2 vehicle emission standards.

5.2.2 Heavy-Duty Gasoline and Diesel Highway Vehicles Standards

New EPA standards designed to reduce NOx and VOC emissions from heavy-duty gasoline and diesel highway vehicles will begin to take effect in 2004. A second phase of standards and testing procedures, beginning in 2007, will reduce particulate matter from heavy-duty highway engines, and will also reduce highway diesel fuel sulfur content to 15 ppm since the sulfur damages emission control devices. The total program is expected to achieve a 90% reduction in PM emissions and a 95% reduction in NOx emissions for these new engines using low sulfur diesel, compared to existing engines using higher-content sulfur diesel.

5.2.3 Large Nonroad Diesel Engines Proposed Rule

The EPA has proposed new rules for large nonroad diesel engines, such as those used in construction, agricultural, and industrial equipment, to be phased in between 2008 and 2014. The proposed rules would also reduce the allowable sulfur in nonroad diesel fuel by over 99%. Nonroad diesel fuel currently averages about 3,400 ppm sulfur. The proposed rules limit nonroad diesel sulfur content to 500 ppm in 2007 and 15 ppm in 2010. The combined engine and fuel rules would reduce NOx and particulate matter emissions from large nonroad diesel engines by over 90 %, compared to current nonroad engines using higher-content sulfur diesel.

5.2.4 Nonroad Spark-Ignition Engines and Recreational Engines Standard

The new standard, effective in July 2003, will regulate NOx, HC and CO for groups of previously unregulated nonroad engines. The new standard will apply to all new engines sold in the US and imported after these standards begin and large spark-ignition engines (forklifts and airport ground service equipment), recreational vehicles (off-highway motorcycles and all-terrain-vehicles), and recreational marine diesel engines. The regulation varies based upon the type of engine or vehicle.

The large spark-ignition engines contribute to ozone formation and ambient CO and PM levels in urban areas. Tier 1 of this standard is scheduled for implementation in 2004 and Tier 2 is scheduled to start in 2007. Like the large spark-ignition, recreational vehicles contribute to ozone formation and ambient CO and PM levels. They can also be a factor in regional haze and other visibility problems in both state and national parks. For the off-highway motorcycles and all-terrain-vehicles, model year 2006, the new exhaust emissions standard will be phased-in by 50% and for model years 2007 and later a 100%. Recreational marine diesel engines over 37 kW are used in yachts, cruisers, and other types of pleasure craft. Recreational marine engines contribute to ozone formation and PM levels, especially in marinas. Depending on the size of the engine, the standard for will begin phase-in in 2006.

When all of the standards are fully implemented, an overall 72% reduction in HC, 80% reduction in NOx, and 56% reduction in CO emissions are expected by 2020. These controls will help reduce ambient concentrations of ozone, CO, and fine PM.

5.3 Local EAC Control Measures

Place Holder for EACs to add discussion

6 ATTAINMENT DEMONSTRATION

6.1 Status of Current Modeling

Modeling completed to date include: the base case model evaluation/validation runs, the current year modeling runs and the preliminary 2007 future year modeling runs. The results of these modeling runs can be viewed at the NCDAQ modeling website:

http://www.cep.unc.edu/empd/projects2/NCDAQ/PGM/results/

NCDAQ will complete the final 2007 future year modeling run with the updates described in the emissions inventory section. Additionally, the continued maintenance demonstration modeling runs for 2012 and 2017 will be completed in the following months. The results of these modeling runs will be part of the State's submittal in December 2004.

Some errors were found in the base year modeling inventories outside of North Carolina. The magnitude of the errors will be evaluated and, if warranted, the base year model evaluation/validation runs may be re-run.

6.2 Preliminary Modeling Results

The base case model runs for all three episodes met the validation criteria set by the EPA. The model evaluation statistics can be viewed at the NCDAQ modeling website cited above.

Figures 6.2-1 and 6.2-2 display the modeling results for 8-hour ozone episodic maximum for the 2000 current year and the 2007 future year, respectively, for the 1996 modeling episode. One can see a significant decrease in the 8-hour ozone episode maximum between the current year and the future year. This is better visualized with Figure 6.2-3, the difference plot between the 2007 future year and the 2000 current year 8-hour ozone episodic maximum for the 1996 episode (i.e., 2007 modeling result minus 2000 modeling results). In this figure cool colors, the blues and greens, represents decreases in the 8-hour ozone episodic maximum. These decreases were the results of the all of the State and Federal control measures listed in Section 5 that are expected to be in place by 2007.

The 1997 episode shows similar results. Figures 6.2-4 through 6.2-5 are the 8-hour ozone episodic maximum for the 2000 current year and the 2007 future year, respectively, for the 1997 episode and Figure 6.2-6 is the difference plot between the 2007 future year and the 2000 current year 8-hour ozone episodic maximum for the 1997 episode.

Although the modeling demonstrating continued maintenance of the 8-hour ozone standard into 2012 and 2017 has not been completed to date, modeling has been completed for future year 2010 for a project outside of the EAC modeling. These results can be used to show continued decrease in expected ozone formation beyond the 2007 attainment year.

Modeling results for the 1996 and 1997 episodes using the 2010 future year inventory does continue to show attainment and further reduction in ozone levels compared to the 2007 modeling. Figure 6.2-7 and 6.2-8 display the modeling results for the 1996 episode using the 2010 emissions inventory, showing the 8-hour ozone episodic maximum and the difference plot between 2010 future year and the 2000 current year 8-hour ozone episodic maximum, respectively. In the 2010 difference plots, cool colors of blue and green represent decreases in the 8-hour ozone episodic maximum. Figures 6.2-9 and 6.2-10 display the 8-hour ozone episodic maximum and difference plot, respectively, for the 1997 episode as modeled for future year 2010 (compared to current year 2000). These results are consistent with the 1996 episode results.

Figure 6.2-1 2000 current year 8-hour ozone episodic maximum for the 1996 episode.

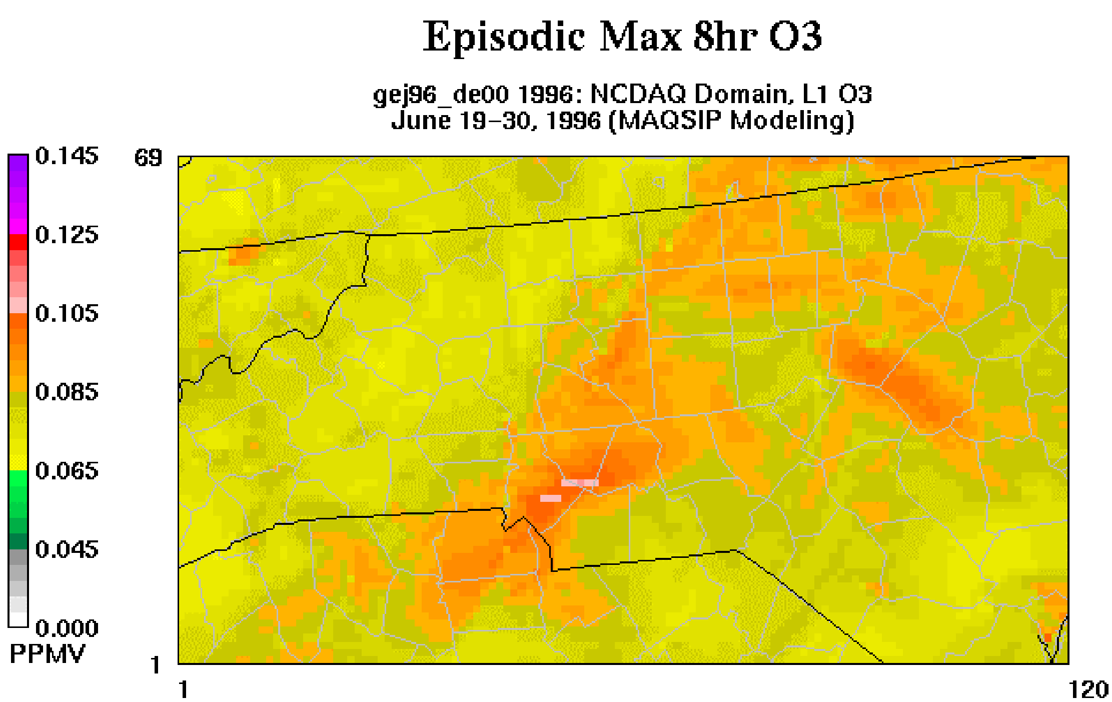


Figure 6.2-2 2007 future year 8-hour ozone episodic maximum for the 1996 episode.

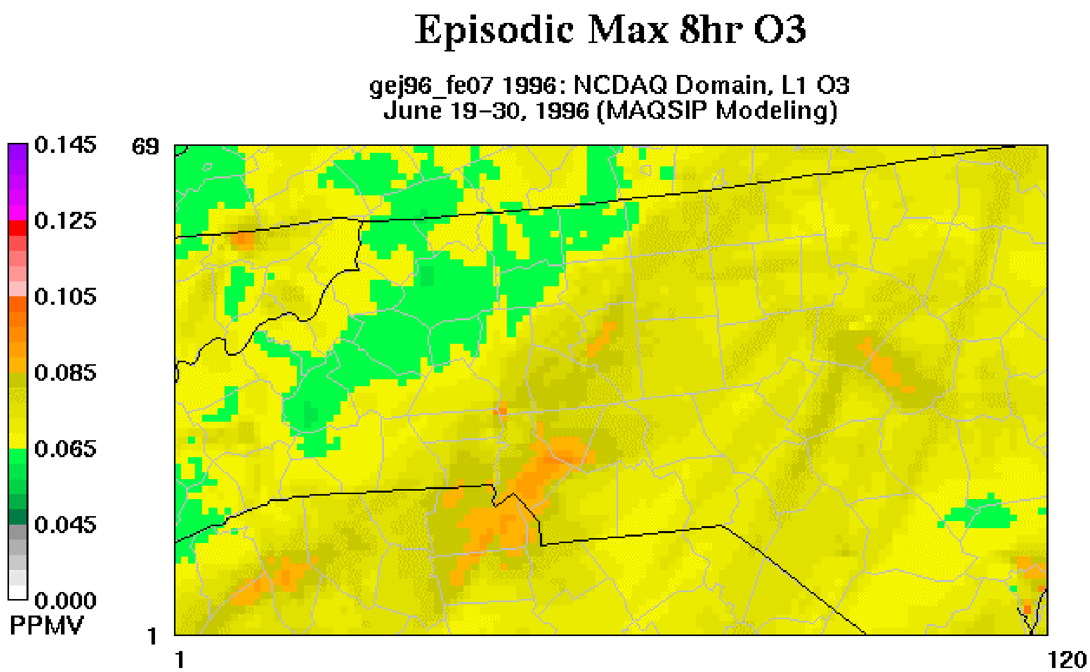


Figure 6.2-3 Difference plot between the 2007 future year and the 2000 current year 8-hour ozone episodic maximum for the 1996 episode.

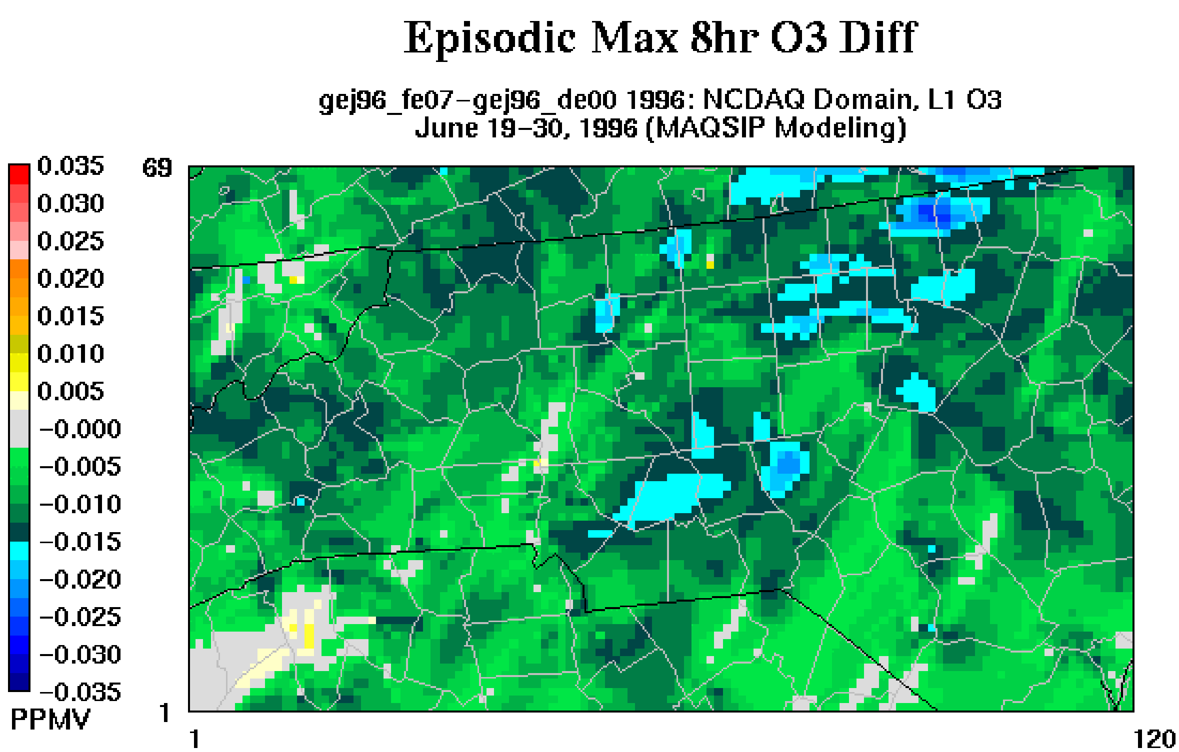


Figure 6.2-4 2000 current year 8-hour ozone episodic maximum for the 1997 episode.

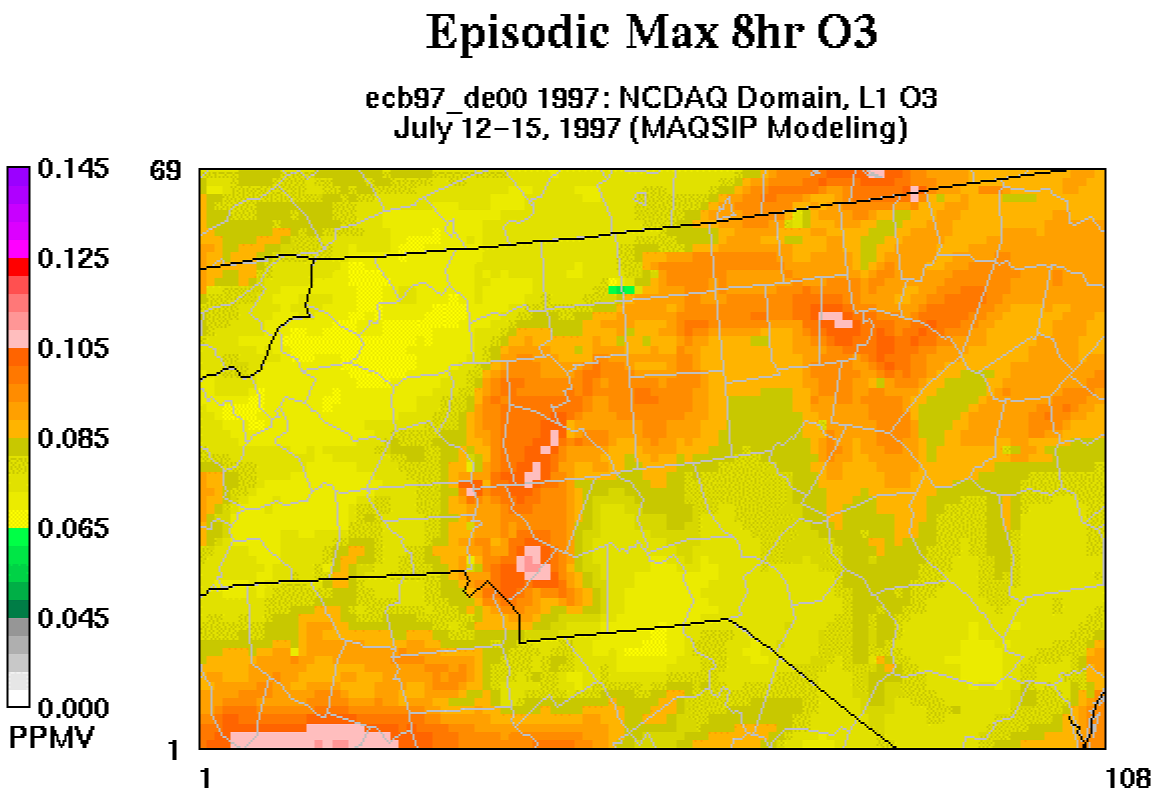


Figure 6.2-5 2007 future year 8-hour ozone episodic maximum for the 1997 episode.

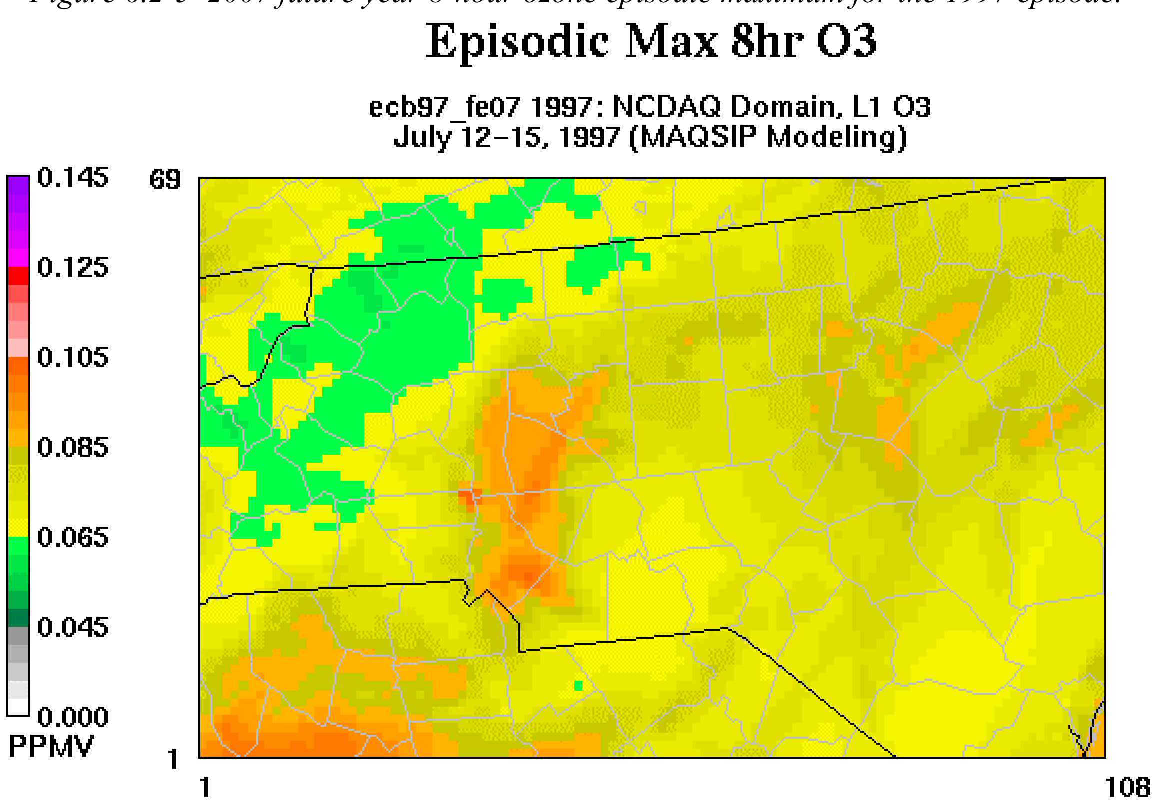


Figure 6.2-6 Difference plot between the 2007 future year and the 2000 current year 8-hour ozone episodic maximum for the 1997 episode.

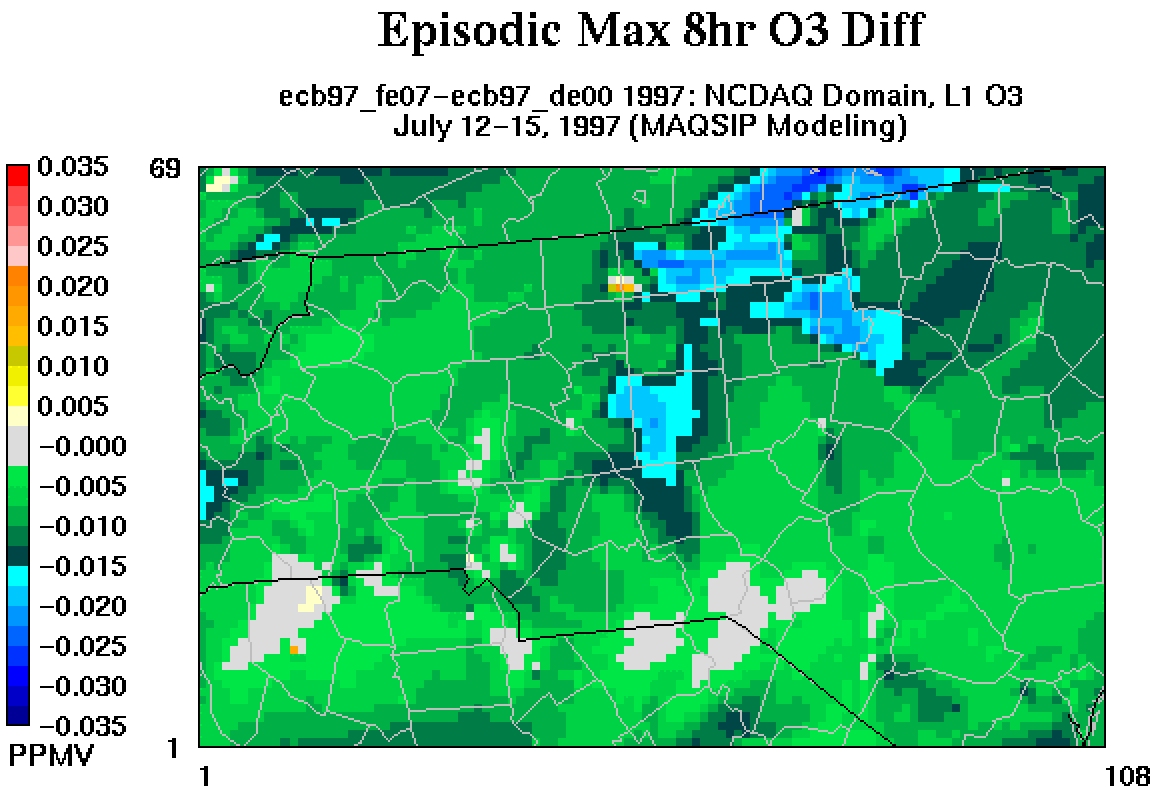


Figure 6.2-7 2010 future year 8-hour ozone episodic maximum for the 1996 episode.

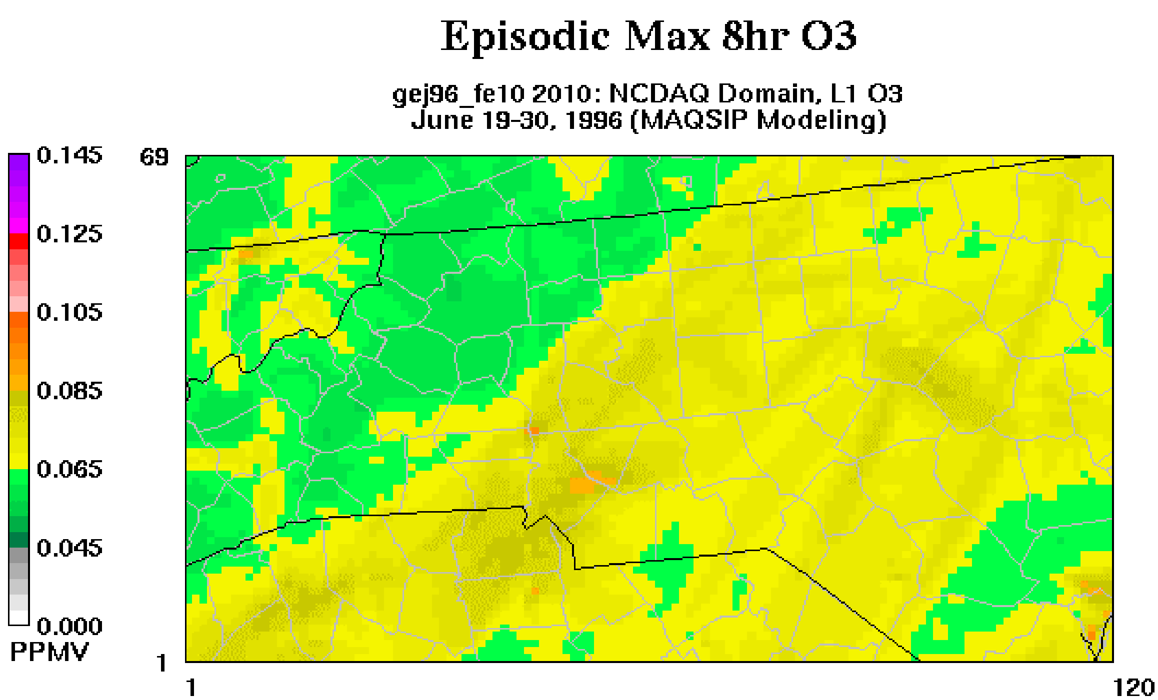


Figure 6.2-8 Difference plot between the 2010 future year and the 2000 current year 8-hour ozone episodic maximum for the 1996 episode.

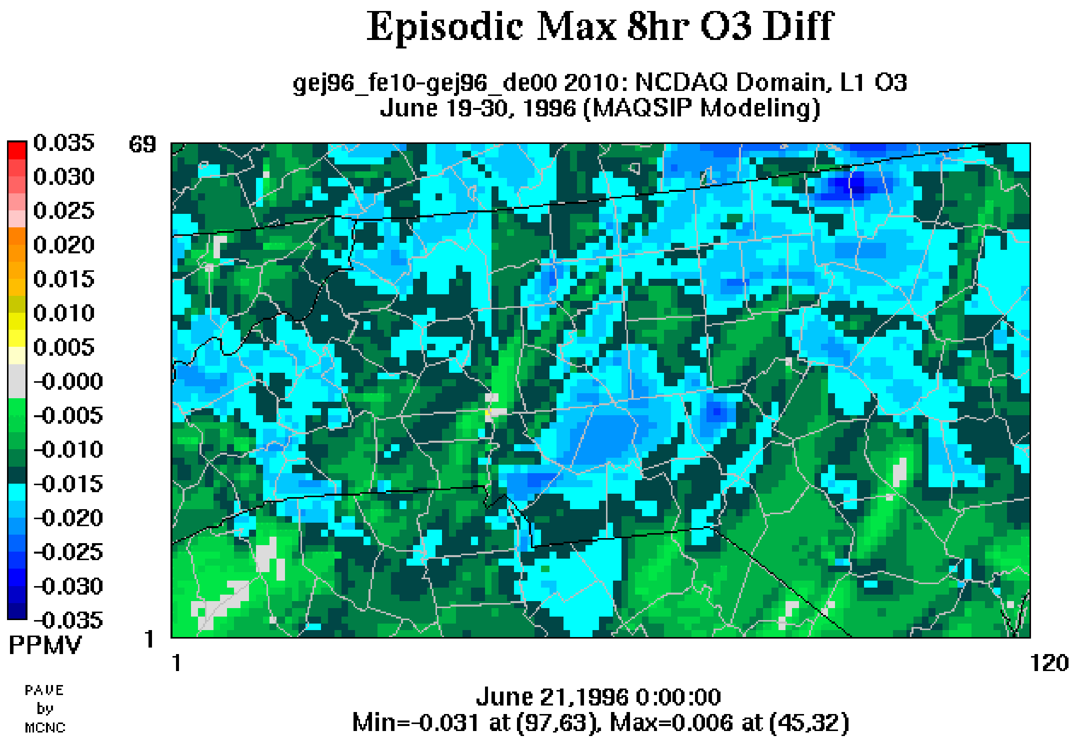


Figure 6.2-9 2010 future year 8-hour ozone episodic maximum for the 1997 episode

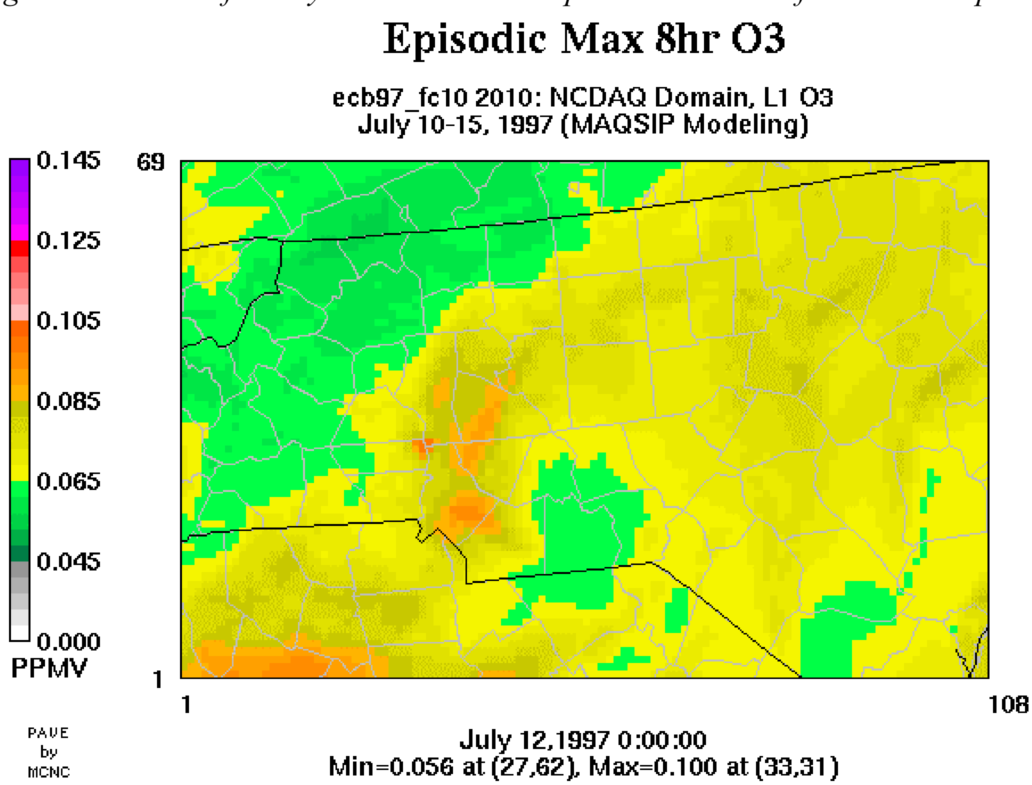
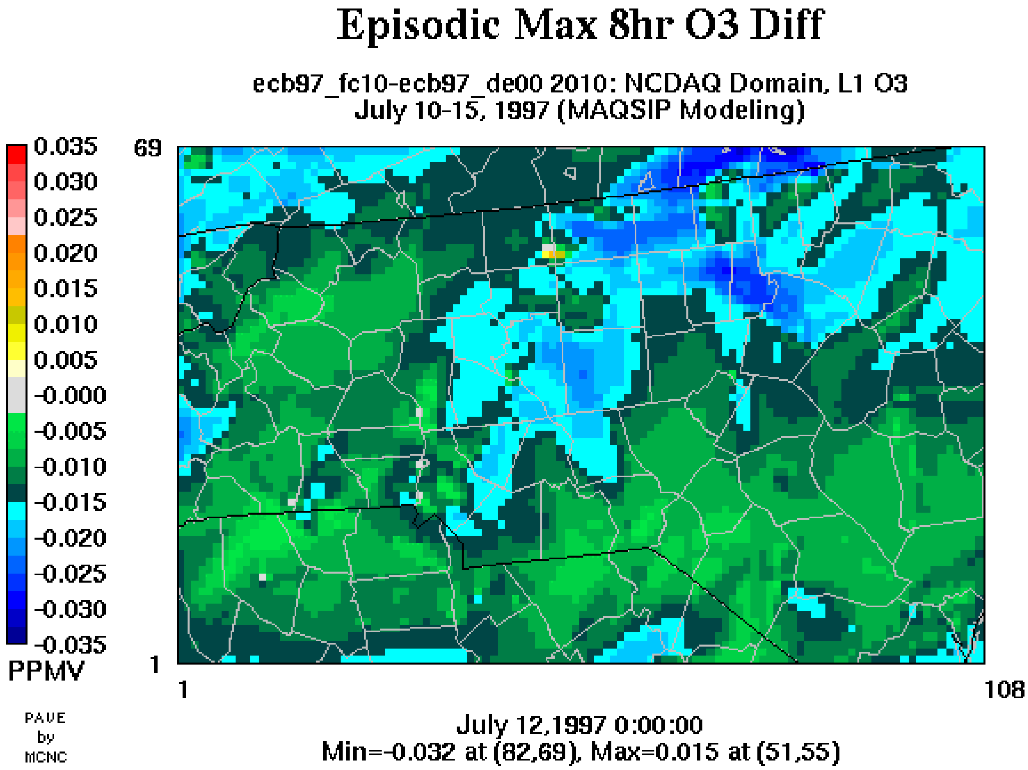


Figure 6.2-10 Difference plot between the 2010 future year and the 2000 current year 8-hour ozone episodic maximum for the 1997 episode



6.3 Geographic Area Needing Further Controls

The current draft version of EPA's attainment test was applied to the modeling results. In very basic and general language the attainment guidance states if the future year design value for a given monitor is below 0.085 parts per million (ppm) then the monitor passes the attainment test. The future year design value of a monitor is calculated by multiplying the current year design value of a monitor by a relative reduction factor (Equation 6.3-1).

$$DVF = DVC \times RRF \qquad \text{Equation 6.3-1}$$

Where DVF is the Future year Design Value,
DVC is the Current year Design Value, and
RRF is the relative reduction factor.

The Current year Design Value (DVC) in the attainment test framework is defined as the higher of: (a) the average 4th highest value for the 3-yr period used to designate an area "nonattainment", and (b) the average 4th highest value for the 3-yr period straddling the year represented by the most recent available emissions inventory. In this exercise, the DVC used to designate an area nonattainment will be 2001-2003 and the DVC straddling the year represented by the most recent available emissions inventory is 1999-2001. The higher of those two values is shown in Table 6.3-1 as the DVC.

The relative reduction factor (RRF) is calculated by taking the ratio of the future year modeling 8-hour ozone daily maximum to the current year modeling 8-hour ozone daily maximum “near” the monitor averaged over all of the episode days (Equations 6.3-2).

$$RRF = \frac{\text{mean future yr. 8-hr daily max “near” monitor “x”}}{\text{mean current yr. 8-hr daily max “near” monitor “x”}} \qquad \text{Equation 6.3-2}$$

The results of applying the attainment test showed all monitors in the Mountain EAC area in attainment of the 8-hour ozone NAAQS in 2007. These results are displayed in Table 6.3-1 below.

Table 6.3-1 2007 Attainment Test Results for the Mountain EAC Area

Monitor Name	DVC (ppm)	RRF	DVF (ppm)
Bent Creek	0.083	0.92	0.076
Fry Pan	0.087	0.92	0.080
Purchase Knob	0.087	0.91	0.079
Waynesville	0.080	0.89	0.071

Table 6.3-2 shows the results of applying the attainment test for the EAC monitors in 2010. These preliminary results indicate that the expected State and Federal control measures already in place by 2010 results in all monitors in the Mountain EAC area attaining the 8-hour ozone NAAQS. In fact, all of the expected future year design values dropped between the 2007 and 2010 modeling runs, indicating that continued maintenance of the standard in 2012 would be expected.

Table 6.3-2 2010 Attainment Test Results for the Mountain EAC Area

Monitor Name	DVC (ppm)	RRF	DVF (ppm)
Bent Creek	0.083	0.86	0.071
Fry Pan	0.087	0.85	0.073
Purchase Knob	0.087	0.82 *	0.071 *
Waynesville	0.080	0.84	0.067

* Test results are determined from the 12-km model results.

6.4 Anticipated Resource Constraints

The resource constraint of most concern is the funding needed to implement some of the local control measures. NCDAQ and the local EAC areas are both looking for grant opportunities to help fund EAC initiatives.

References:

1. U.S. EPA. National Ambient Air Quality Standards. http://www.epa.gov/airs/criteria.html.

2. McConnell et al. 2002. Asthma in exercising children exposed to ozone: a cohort study. Lancet 359: 386-391.

3. U.S. EPA. "Smog – Who Does It Hurt? What You Need to Know about Ozone and Your Health" http://www.epa.gov/airnow/health/index.html.

APPENDIX A

Stationary Point Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Alamance	0.68	0.66	1.60	0.07	0.76	1.03
Alexander	0.03	0.04	1.38	0.02	0.00	1.66
Alleghany	0.00	0.01	0.03			
Anson	0.13	0.46	0.38	0.00	0.00	0.00
Ashe	0.23	0.16	0.34	0.03	0.01	1.23
Avery	0.00	0.01	0.00			
Beaufort	0.04	0.20	0.30	1.48	2.48	0.34
Bertie	0.69	0.36	0.57	0.18	0.27	1.04
Bladen	0.40	1.19	0.49	0.23	2.33	0.58
Brunswick	14.55	6.64	3.87	4.78	9.81	2.79
Buncombe	1.25	53.32	3.60	13.78	13.79	3.10
Burke	2.55	0.84	5.18	7.87	0.61	13.73
Cabarrus	0.82	3.03	4.06	0.18	2.10	3.60
Caldwell	1.35	1.19	21.88	0.51	0.16	28.09
Camden	0.00	0.00	0.00			
Carteret	0.15	0.22	0.30	0.01	0.11	0.00
Caswell						
Catawba	4.16	96.23	18.81	13.14	51.84	20.46
Chatham	4.51	21.19	2.21	7.90	4.72	2.16
Cherokee	0.02	0.02	0.22			
Chowan	0.03	0.21	0.37	0.03	0.15	0.01
Clay						
Cleveland	0.82	1.70	1.04	0.80	4.46	1.62
Columbus	20.82	15.41	6.93	15.75	9.05	2.53
Craven	4.94	4.21	3.73	4.54	4.94	1.85
Cumberland	1.22	3.16	4.08	0.51	3.76	6.86
Currituck	0.08	0.01	0.00			
Dare	0.05	0.19	0.01	0.01	0.34	0.00
Davidson	3.31	12.16	15.05	3.02	6.34	20.47
Davie	0.17	0.20	1.98	0.09	0.04	3.79
Duplin	0.24	1.10	0.14	1.11	2.41	0.02
Durham	1.00	1.58	1.19	0.30	1.03	5.73
Edgecombe	0.49	5.95	0.90	0.43	7.29	0.02
Forsyth	2.09	6.15	9.76	1.96	6.78	19.96
Franklin	0.28	0.21	1.71	0.01	0.13	0.12
Gaston	3.67	86.48	5.40	21.44	38.21	7.51

Stationary Point Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Gates	0.08	0.03	0.10			
Graham	0.09	0.08	1.29	0.02	0.02	1.38
Granville	0.34	0.36	1.79	0.37	0.13	1.92
Greene	0.00	0.07	0.00			
Guilford	1.59	1.83	18.13	0.17	0.88	39.44
Halifax	6.22	10.72	1.71	17.11	12.80	0.41
Harnett	0.20	0.33	1.12	0.23	0.63	0.62
Haywood	7.85	12.48	5.00	9.26	16.05	2.44
Henderson	0.25	0.31	3.79	0.03	0.43	4.53
Hertford	1.33	0.47	1.13	0.02	0.17	0.24
Hoke	0.08	0.25	0.40	34.24	1.00	10.35
Hyde	0.00	0.04	0.00			
Iredell	3.58	9.98	20.42	3.63	11.15	4.37
Jackson	0.60	0.52	0.38	0.00	0.05	0.00
Johnston	0.80	0.46	1.80	0.02	0.15	2.46
Jones						
Lee	1.37	0.42	1.27	1.14	0.28	0.75
Lenoir	0.63	2.27	1.30	0.14	3.10	0.23
Lincoln	0.76	5.82	2.73	8.90	14.26	2.18
McDowell	2.12	1.04	3.87	0.78	0.71	1.33
Macon	0.11	0.08	0.05			
Madison	0.02	0.07	0.00			
Martin	10.72	10.38	3.24	31.74	9.97	3.18
Mecklenburg	5.49	2.30	11.99	3.32	3.73	23.26
Mitchell	0.41	0.50	2.49	0.13	0.02	2.09
Montgomery	0.24	0.32	1.99	0.05	0.01	0.02
Moore	0.17	0.14	2.29	0.02	0.00	1.74
Nash	9.02	0.97	2.67	0.50	1.06	0.56
NewHanover	35.65	31.96	6.52	46.31	49.30	6.49
Northampton	1.10	0.30	0.86	0.14	0.30	0.10
Onslow	0.34	1.77	0.16	0.09	1.22	0.02
Orange	2.86	1.80	0.37	3.37	0.78	0.01
Pamlico						
Pasquotank	0.10	0.07	0.07	0.01	0.02	0.03
Pender	0.00	0.00	0.05	0.02	0.03	0.01
Perquimans						
Person	5.79	205.34	1.36	13.83	32.70	1.22
Pitt	1.06	0.88	1.95	0.37	0.75	1.11
Polk	0.02	0.03	0.00			
Randolph	0.53	0.38	4.01	0.02	0.07	2.33
Richmond	0.33	0.26	0.17	323.38	11.45	10.71
Robeson	0.92	17.43	1.12	1.64	13.56	2.28
Rockingham	5.60	34.09	16.65	17.02	16.47	8.01

Stationary Point Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Rowan	2.28	37.52	8.27	15.19	19.17	11.65
Rutherford	3.24	49.60	2.56	4.66	13.67	3.45
Sampson	0.24	0.23	0.22			
Scotland	0.38	6.14	3.60	0.57	8.50	7.33
Stanly	26.81	1.15	1.79	17.59	1.36	1.94
Stokes	8.15	324.10	1.01	5.16	22.79	0.62
Surry	3.28	1.09	6.10	6.10	1.06	4.12
Swain	0.00	0.00	0.12			
Transylvania	0.21	5.00	2.83	0.25	7.01	2.55
Tyrrell						
Union	0.81	0.68	1.81	0.03	0.17	2.54
Vance	0.34	1.52	1.16	0.04	1.45	0.00
Wake	1.59	1.49	4.24	0.27	0.94	10.08
Warren	0.18	0.08	0.07			
Washington	0.00	0.00	0.00	0.00	0.01	0.00
Watauga	0.17	0.18	0.13	0.02	0.05	0.00
Wayne	5.08	19.84	3.38	24.50	27.43	1.85
Wilkes	1.88	0.97	5.69	3.68	0.83	6.11
Wilson	0.51	1.48	3.74	0.22	2.51	1.99
Yadkin	0.01	0.03	0.26	0.00	0.00	0.03
Yancey						

Stationary Area Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Alamance	6.21	0.47	5.78	6.65	0.50	6.17
Alexander	3.26	0.20	2.96	3.42	0.21	2.93
Alleghany	1.00	0.08	0.79	1.03	0.08	0.81
Anson	3.83	0.16	1.40	4.14	0.17	1.47
Ashe	2.29	0.17	1.42	2.36	0.17	1.50
Avery	1.61	0.12	0.85	1.66	0.13	0.90
Beaufort	22.68	0.30	5.75	25.28	0.31	5.93
Bertie	6.46	0.16	3.25	7.09	0.17	3.20
Bladen	5.37	0.25	3.08	5.79	0.25	3.13
Brunswick	5.25	0.39	3.12	5.47	0.40	3.26
Buncombe	5.74	0.55	8.11	5.91	0.58	8.66
Burke	4.02	0.32	3.48	4.15	0.33	3.64
Cabarrus	5.81	0.38	5.88	6.26	0.41	6.52
Caldwell	3.19	0.25	3.91	3.32	0.25	4.05
Camden	7.54	0.05	1.35	8.43	0.05	1.40
Carteret	5.22	0.20	2.96	5.67	0.20	3.10
Caswell	3.96	0.18	1.69	4.24	0.19	1.71

Stationary Area Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Catawba	7.04	0.43	11.22	7.48	0.44	11.37
Chatham	4.82	0.34	2.46	5.18	0.36	2.58
Cherokee	2.29	0.19	1.15	2.35	0.20	1.19
Chowan	2.70	0.09	1.61	2.96	0.09	1.65
Clay	0.83	0.08	0.46	0.85	0.08	0.51
Cleveland	8.89	0.43	4.45	9.53	0.45	4.70
Columbus	10.62	0.41	5.37	11.52	0.42	5.36
Craven	6.34	0.28	4.92	6.87	0.29	5.06
Cumberland	6.32	0.51	11.54	6.76	0.54	12.12
Currituck	8.37	0.14	1.61	9.27	0.14	1.71
Dare	0.86	0.08	1.21	0.89	0.08	1.30
Davidson	9.36	0.65	7.74	9.81	0.67	7.96
Davie	4.37	0.19	1.76	4.69	0.20	1.87
Duplin	17.79	0.37	5.91	19.65	0.38	5.95
Durham	2.25	0.35	7.67	2.42	0.39	8.18
Edgecombe	4.60	0.25	5.60	4.96	0.26	5.50
Forsyth	3.94	0.40	11.46	4.18	0.44	12.21
Franklin	7.51	0.36	3.18	8.19	0.37	3.25
Gaston	5.05	0.52	6.85	5.35	0.56	7.35
Gates	1.82	0.08	1.14	1.95	0.09	1.12
Graham	0.75	0.06	0.35	0.77	0.06	0.37
Granville	7.05	0.27	3.27	7.65	0.28	3.34
Greene	5.83	0.15	2.95	6.40	0.16	2.88
Guilford	10.99	0.95	19.33	11.77	1.04	20.36
Halifax	9.79	0.30	5.16	10.73	0.31	5.19
Harnett	8.91	0.51	5.74	9.49	0.52	5.80
Haywood	2.44	0.21	2.08	2.51	0.21	2.18
Henderson	4.02	0.37	3.51	4.14	0.38	3.72
Hertford	5.54	0.13	2.34	6.11	0.13	2.38
Hoke	3.54	0.16	1.85	3.82	0.16	1.88
Hyde	4.91	0.05	1.45	5.48	0.05	1.45
Iredell	9.47	0.51	6.14	10.19	0.54	6.46
Jackson	2.45	0.21	1.23	2.52	0.21	1.30
Johnston	12.71	0.73	9.46	13.78	0.76	9.42
Jones	4.70	0.08	1.81	5.20	0.09	1.78
Lee	4.54	0.21	2.57	4.90	0.22	2.68
Lenoir	8.28	0.26	5.44	9.09	0.27	5.45
Lincoln	6.50	0.30	2.82	7.01	0.31	3.04
McDowell	2.28	0.20	1.30	2.35	0.21	1.37
Macon	1.85	0.14	0.98	1.90	0.14	1.02
Madison	1.87	0.18	1.41	1.93	0.18	1.42
Martin	5.52	0.23	3.59	5.93	0.24	3.54
Mecklenburg	4.61	0.99	25.87	4.97	1.12	28.14

Stationary Area Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Mitchell	1.47	0.11	0.91	1.52	0.11	0.93
Montgomery	2.44	0.18	1.81	2.53	0.19	1.83
Moore	4.97	0.35	3.49	5.20	0.37	3.66
Nash	9.24	0.42	7.76	10.02	0.44	7.75
NewHanover	0.77	0.12	6.04	0.79	0.13	6.51
Northampton	5.09	0.16	2.65	5.55	0.17	2.60
Onslow	6.21	0.34	5.99	6.59	0.35	6.29
Orange	5.03	0.40	4.54	5.42	0.43	4.79
Pamlico	6.27	0.10	1.38	6.95	0.11	1.44
Pasquotank	12.97	0.14	3.18	14.47	0.14	3.37
Pender	5.90	0.28	2.47	6.30	0.29	2.61
Perquimans	6.91	0.09	1.76	7.68	0.09	1.79
Person	6.29	0.23	2.42	6.85	0.24	2.49
Pitt	9.95	0.46	9.13	10.78	0.47	9.36
Polk	1.57	0.13	0.70	1.61	0.13	0.74
Randolph	10.44	0.66	9.38	11.07	0.68	9.47
Richmond	2.58	0.20	2.01	2.71	0.21	2.11
Robeson	28.32	0.70	9.95	31.17	0.72	10.19
Rockingham	8.86	0.46	4.47	9.48	0.48	4.64
Rowan	9.50	0.46	5.66	10.28	0.49	6.08
Rutherford	4.44	0.31	2.68	4.64	0.33	2.96
Sampson	17.24	0.43	7.57	18.96	0.44	7.53
Scotland	7.55	0.17	2.36	8.33	0.17	2.47
Stanly	8.31	0.32	3.28	9.01	0.33	3.42
Stokes	4.56	0.26	2.42	4.82	0.27	2.45
Surry	6.15	0.37	4.01	6.47	0.38	4.16
Swain	1.22	0.10	0.50	1.26	0.10	0.52
Transylvania	1.75	0.16	1.08	1.80	0.17	1.14
Tyrrell	10.04	0.03	1.72	11.27	0.04	1.79
Union	23.79	0.55	7.20	26.31	0.58	7.68
Vance	4.19	0.19	2.43	4.52	0.19	2.51
Wake	10.49	1.24	24.71	11.31	1.35	26.08
Warren	4.18	0.16	1.44	4.52	0.16	1.47
Washington	12.80	0.08	2.51	14.34	0.09	2.60
Watauga	2.41	0.20	1.82	2.48	0.20	1.91
Wayne	16.32	0.48	7.91	17.91	0.49	8.07
Wilkes	4.79	0.37	3.35	4.95	0.38	3.49
Wilson	5.47	0.29	6.51	5.92	0.30	6.46
Yadkin	6.30	0.23	2.77	6.82	0.23	2.85
Yancey	1.67	0.12	0.90	1.72	0.13	0.92

Nonroad Mobile Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Alamance	29.54	2.98	2.37	33.64	2.91	2.04
Alexander	4.00	0.51	0.37	4.36	0.53	0.33
Alleghany	2.49	0.36	0.18	2.78	0.33	0.14
Anson	4.19	1.13	0.50	4.55	0.95	0.39
Ashe	3.91	0.44	0.41	4.54	0.43	0.44
Avery	5.37	0.52	0.59	6.39	0.47	0.65
Beaufort	13.85	2.81	2.74	15.07	2.51	2.30
Bertie	6.43	1.66	1.12	6.78	1.48	0.88
Bladen	8.96	1.81	1.44	10.50	1.59	1.66
Brunswick	27.00	2.10	4.70	30.90	1.88	4.16
Buncombe	48.93	4.51	4.43	57.45	4.28	4.27
Burke	14.79	2.10	1.51	16.50	2.05	1.51
Cabarrus	44.68	4.19	3.28	51.35	3.78	2.38
Caldwell	16.55	2.38	1.77	18.65	2.34	1.89
Camden	2.84	0.41	0.99	2.90	0.39	0.80
Carteret	49.17	1.82	14.18	54.95	1.90	12.43
Caswell	2.26	1.07	0.23	2.51	0.85	0.17
Catawba	47.03	5.15	4.20	53.29	5.17	3.95
Chatham	12.91	1.83	1.40	14.40	1.68	1.09
Cherokee	3.99	0.40	0.56	4.58	0.40	0.57
Chowan	4.05	0.47	1.14	4.45	0.46	1.03
Clay	2.19	0.15	0.43	2.72	0.14	0.54
Cleveland	21.51	2.13	1.75	24.58	2.08	1.52
Columbus	9.85	2.12	1.11	11.13	1.89	1.00
Craven	24.08	2.20	2.66	27.45	1.94	1.98
Cumberland	59.31	6.51	4.85	68.38	5.86	3.84
Currituck	15.63	0.77	4.69	17.55	0.77	4.24
Dare	46.18	1.33	18.14	49.76	1.54	15.68
Davidson	30.96	4.24	2.64	35.03	3.90	2.24
Davie	6.77	0.61	0.88	8.20	0.61	1.12
Duplin	10.19	2.36	0.97	11.18	2.13	0.73
Durham	70.50	9.63	6.04	79.17	9.06	5.09
Edgecombe	11.11	2.57	0.97	12.27	2.28	0.78
Forsyth	91.57	6.94	6.70	105.60	6.76	5.27
Franklin	8.37	1.05	0.78	9.71	0.93	0.70
Gaston	54.10	4.77	3.98	61.82	4.70	3.33
Gates	1.58	0.50	0.21	1.69	0.45	0.16
Graham	1.40	0.13	0.25	1.55	0.12	0.20
Granville	13.73	1.39	1.23	15.64	1.32	1.03
Greene	2.31	0.70	0.21	2.52	0.64	0.16
Guilford	194.02	14.69	14.06	226.39	13.97	10.89

Nonroad Mobile Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Halifax	8.68	2.13	0.92	9.77	1.86	0.83
Harnett	22.07	1.84	1.65	25.33	1.72	1.21
Haywood	11.35	1.08	1.15	13.38	1.00	1.19
Henderson	31.53	2.07	3.82	38.22	1.95	4.41
Hertford	4.08	0.54	0.48	4.74	0.50	0.48
Hoke	3.35	0.64	0.28	3.61	0.62	0.24
Hyde	25.38	1.93	11.68	25.59	1.94	9.56
Iredell	21.67	2.88	2.10	24.69	2.78	1.97
Jackson	6.55	0.51	0.75	7.75	0.46	0.76
Johnston	35.04	3.41	2.84	40.55	3.09	2.26
Jones	1.83	0.46	0.15	2.05	0.41	0.12
Lee	16.81	2.46	1.35	18.80	2.29	1.07
Lenoir	16.43	2.14	1.31	18.63	2.00	1.01
Lincoln	14.00	1.49	1.27	16.03	1.38	1.10
McDowell	7.93	1.84	1.14	9.18	1.61	1.36
Macon	10.89	0.53	0.97	12.89	0.50	0.91
Madison	1.73	0.56	0.17	1.96	0.45	0.13
Martin	4.71	1.32	0.51	5.37	1.16	0.51
Mecklenburg	351.64	23.31	24.93	298.78	21.99	18.42
Mitchell	3.61	1.02	0.51	4.27	0.85	0.61
Montgomery	4.89	0.71	0.58	5.34	0.66	0.48
Moore	27.52	1.89	1.95	31.86	1.73	1.41
Nash	21.77	2.69	1.71	24.83	2.47	1.32
NewHanover	58.02	4.59	5.80	67.25	4.20	4.55
Northampton	4.56	0.97	0.71	5.20	0.86	0.65
Onslow	26.34	3.52	3.92	29.60	3.21	3.31
Orange	31.55	3.66	3.18	37.13	3.19	3.09
Pamlico	9.11	0.88	3.58	9.63	0.85	3.09
Pasquotank	9.56	0.93	1.42	10.86	0.88	1.12
Pender	13.17	1.02	1.77	15.00	0.95	1.44
Perquimans	3.95	0.65	1.27	4.10	0.60	1.02
Person	8.34	0.85	0.80	9.41	0.82	0.64
Pitt	25.16	4.26	1.98	28.79	3.78	1.53
Polk	2.69	0.46	0.22	3.03	0.39	0.17
Randolph	27.23	2.82	2.20	30.77	2.85	1.94
Richmond	14.38	4.66	1.43	15.38	4.02	1.05
Robeson	19.63	5.97	1.91	21.45	5.21	1.62
Rockingham	15.35	2.44	1.55	17.39	2.26	1.63
Rowan	28.37	5.47	2.59	31.85	4.75	2.11
Rutherford	13.10	2.19	1.27	14.86	2.00	1.27
Sampson	10.67	2.15	0.92	11.89	1.96	0.70
Scotland	8.59	1.82	0.75	9.46	1.64	0.63
Stanly	16.77	2.09	1.54	19.02	1.96	1.29

Nonroad Mobile Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Stokes	8.18	0.68	0.72	9.54	0.61	0.64
Surry	30.76	1.96	2.43	35.44	1.98	2.05
Swain	4.84	0.35	1.35	6.47	0.32	1.88
Transylvania	15.89	0.68	2.79	20.28	0.67	3.77
Tyrrell	6.72	0.61	2.94	6.76	0.61	2.38
Union	47.65	3.89	3.56	55.34	3.56	2.71
Vance	6.24	1.24	0.75	6.84	1.14	0.62
Wake	242.05	18.83	17.61	281.90	17.33	12.59
Warren	3.51	0.70	0.58	3.85	0.56	0.43
Washington	5.43	1.03	1.44	5.68	0.95	1.16
Watauga	9.79	0.50	1.19	12.02	0.48	1.41
Wayne	26.05	3.51	2.10	29.98	3.27	1.71
Wilkes	16.62	1.37	1.38	19.09	1.32	1.17
Wilson	23.57	2.99	1.95	27.15	2.67	1.56
Yadkin	6.59	0.89	0.52	7.45	0.83	0.40
Yancey	7.75	0.37	0.87	9.32	0.34	0.94

Highway Mobile Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Alamance	93.84	13.48	8.34	54.81	9.52	5.01
Alexander	15.87	1.75	1.41	10.67	1.27	1.02
Alleghany	6.87	0.74	0.61	3.84	0.45	0.37
Anson	22.65	2.93	1.90	14.23	2.00	1.25
Ashe	15.28	1.61	1.36	8.98	1.03	0.86
Avery	13.78	1.66	1.18	7.98	1.05	0.73
Beaufort	31.89	3.55	2.81	19.36	2.35	1.81
Bertie	19.81	2.38	1.70	12.41	1.61	1.14
Bladen	29.89	3.22	2.65	18.60	2.18	1.78
Brunswick	67.90	8.19	5.82	39.68	5.53	3.69
Buncombe	149.98	23.51	13.10	87.96	16.25	7.83
Burke	65.51	12.34	5.64	36.98	7.79	3.38
Cabarrus	69.09	12.04	6.19	50.62	8.59	4.20
Caldwell	44.10	5.01	3.89	25.98	3.41	2.48
Camden	7.47	0.90	0.64	4.68	0.61	0.43
Carteret	43.77	5.41	3.74	22.53	3.19	2.10
Caswell	16.69	2.00	1.44	10.41	1.34	0.95
Catawba	113.03	15.57	10.08	66.68	10.71	6.25
Chatham	45.51	5.79	3.85	27.65	4.01	2.55
Cherokee	17.05	2.25	1.42	12.85	1.73	1.15
Chowan	8.16	0.92	0.72	4.87	0.60	0.45
Clay	6.05	0.68	0.53	3.81	0.46	0.36

Highway Mobile Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Cleveland	68.95	10.19	5.97	37.44	6.17	3.49
Columbus	43.72	5.12	3.80	27.16	3.52	2.47
Craven	57.77	6.75	5.06	34.07	4.53	3.19
Cumberland	197.16	28.43	17.85	108.27	18.56	10.31
Currituck	21.48	2.50	1.86	14.09	1.77	1.33
Dare	37.56	4.27	3.27	20.22	2.55	1.89
Davidson	105.57	17.25	9.73	61.60	11.04	6.06
Davie	32.17	7.98	2.67	20.32	5.05	1.78
Duplin	46.97	8.80	4.00	32.00	6.34	2.86
Durham	130.59	24.00	11.93	90.71	14.51	7.74
Edgecombe	41.11	4.72	3.61	23.96	3.17	2.28
Forsyth	188.14	33.73	18.97	125.17	19.34	12.44
Franklin	32.41	3.79	2.81	19.70	2.63	1.89
Gaston	87.61	16.61	8.66	56.34	9.20	5.28
Gates	8.85	1.12	0.75	5.30	0.73	0.47
Graham	4.84	0.50	0.43	3.31	0.39	0.32
Granville	48.49	9.82	5.02	27.96	5.43	3.29
Greene	14.77	1.63	1.30	9.41	1.14	0.89
Guilford	274.08	47.66	27.88	179.81	26.94	18.09
Halifax	48.63	11.44	4.09	31.41	7.19	2.75
Harnett	58.38	9.34	5.01	34.75	6.19	3.25
Haywood	58.30	14.16	4.81	33.85	8.92	2.99
Henderson	59.39	10.05	5.15	34.27	6.56	3.17
Hertford	15.08	1.71	1.32	9.26	1.14	0.87
Hoke	18.56	2.22	1.60	12.36	1.62	1.13
Hyde	4.39	0.48	0.39	2.61	0.32	0.25
Iredell	119.96	29.26	10.08	71.75	18.66	6.42
Jackson	36.42	4.77	3.04	23.49	3.29	2.08
Johnston	123.04	28.31	10.21	81.29	19.92	7.25
Jones	14.67	1.89	1.23	8.62	1.19	0.76
Lee	39.67	4.49	3.51	23.25	3.03	2.21
Lenoir	44.38	4.70	4.04	23.50	2.85	2.31
Lincoln	37.27	4.27	3.28	21.48	2.82	2.08
McDowell	42.05	9.85	3.48	26.32	3.48	2.37
Macon	24.61	3.09	2.08	15.13	2.02	1.37
Madison	13.33	1.64	1.14	8.25	1.10	0.75
Martin	25.08	3.06	2.15	15.47	3.65	1.34
Mecklenburg	341.23	67.76	34.75	222.60	36.34	21.26
Mitchell	9.55	1.09	0.83	5.95	0.75	0.55
Montgomery	26.55	3.60	2.27	18.18	2.61	1.66
Moore	53.39	5.90	4.73	29.76	3.77	2.87
Nash	93.59	17.62	7.97	53.90	10.92	4.94
NewHanover	81.67	9.12	7.49	48.41	6.14	4.72

Highway Mobile Sources Emissions in tons/day

County	2000			2007		
	CO	NOx	VOC	CO	NOx	VOC
Northampton	23.32	4.79	1.95	13.92	2.79	1.24
Onslow	67.91	7.55	6.03	35.66	4.56	3.41
Orange	62.40	18.80	5.30	44.95	11.91	3.63
Pamlico	9.21	0.93	0.83	5.79	0.64	0.56
Pasquotank	17.53	1.94	1.57	11.15	1.36	1.03
Pender	40.59	8.15	3.41	28.50	5.88	2.53
Perquimans	9.69	1.24	0.82	6.19	0.86	0.54
Person	21.02	2.25	1.89	12.96	1.51	1.23
Pitt	78.82	8.47	7.05	43.54	5.36	4.24
Polk	19.00	4.60	1.56	13.94	3.39	1.19
Randolph	97.79	13.69	8.46	57.60	9.14	5.31
Richmond	40.70	4.98	3.52	24.96	3.35	2.22
Robeson	107.26	20.38	9.20	61.34	12.86	5.62
Rockingham	66.14	7.51	5.82	37.21	4.86	3.57
Rowan	89.79	17.34	7.75	53.43	11.46	4.96
Rutherford	40.07	4.52	3.53	20.79	2.69	2.01
Sampson	51.06	8.35	4.42	32.73	5.69	2.97
Scotland	29.90	3.44	2.64	18.93	2.37	1.73
Stanly	37.66	4.01	3.39	20.69	2.53	2.03
Stokes	24.78	2.82	2.17	13.71	1.79	1.32
Surry	64.94	12.67	5.54	37.68	7.79	3.49
Swain	13.82	1.69	1.18	7.71	1.01	0.70
Transylvania	22.41	2.47	1.99	14.04	1.68	1.33
Tyrrell	3.78	0.49	0.32	2.31	0.33	0.20
Union	56.79	7.70	5.15	39.75	5.00	3.48
Vance	33.57	6.29	2.89	22.07	4.29	1.95
Wake	306.82	59.29	27.61	224.96	39.69	18.67
Warren	15.84	3.56	1.32	10.53	2.39	0.92
Washington	11.19	1.43	0.94	6.82	0.95	0.60
Watauga	25.14	3.08	2.17	15.08	2.02	1.34
Wayne	68.83	7.28	6.20	39.66	4.84	3.87
Wilkes	47.93	5.55	4.18	25.57	3.39	2.45
Wilson	61.49	10.12	5.37	35.49	6.44	3.32
Yadkin	34.98	7.13	2.92	21.93	4.42	1.92
Yancey	11.33	1.45	0.96	6.74	0.93	0.60

APPENDIX B